

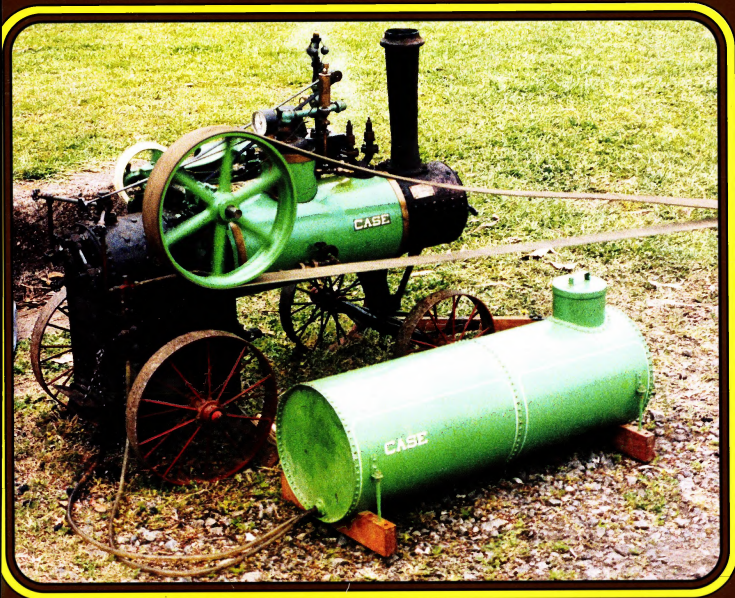
# Australian Model Engineering

January-February 1998

Issue 76

\$5.50\*

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**LOCOMOTIVES, TRACTION & STATIONARY ENGINES, BOATS,  
WORKSHOP, PRODUCTS, CLUB NEWS & EVENTS, REVIEWS**

**In This Issue:** ☒ Build an Accurate Sundial  
☒ NZR Wa Class Locomotives  
☒ O & K's Klug Valve Gear Explained



Print Post Approved, Publication No. PP228582/00001

\* Recommended Retail Price

## MODERN LOCOMOTIVE CONSTRUCTION

by J G A Meyer

Build yourself a locomotive! Meyer was an associate editor of *American Locomotive* magazine, a member of the ASME, and chief draftsman for the Grant Locomotive Works. If any one could take you by the hand and show you how to design an 1892 locomotive from the ground up, he could.

You learn every aspect of design and construction with over a thousand illustrations, most of them being incredibly detailed working drawings. You get detailed how-to knowledge that can only be acquired from working in the industry.

For instance, Meyer discusses milling special grooves in order to remove pressure from the back of the slide valve. Into the grooves are placed metal strips supported by springs. Meyer will tell you the master mechanics in the roundhouse disliked spiral springs because lubricating talow would build up there. Elliptic springs solved the problem but lost their strength over time and created other unique problems.

You get that kind of detail and insider information throughout this big volume. Who on earth needs to know about the effect of lead counterbalance in the rim?... or that bearing pressure can be significantly greater in the knuckle joint pin as com-

# Modern Locomotive Construction

pared to a crankpin? ... or why a sloping crown sheet is much safer when a locomotive is running down hill? You need to know these things and a thousand more if you restore locomotives, build models, study railroad history, or just want to impress the mousers at your mother-in-law's wake.

There is no way I can describe this book other than throw a few quotes at you and reproduce a few of the illustrations. The detail is mind boggling.

Let's suppose you're going to put a diamond-shaped smoke stack on your soft coal-burning locomotive. Meyer shows you a diagram of a typical diamond stack. "...The cylindrical part D of the stack often consists of two shells, leaving an annular space about 5/8 inch wide between them. Sometimes four 1-inch holes are drilled through the outer shell just above the flange A, and another four holes are drilled through the outer shell near the top, for the purpose of creating a circulation of air through the annular space. This arrangement prevents the outer shell from becoming overheated and blistering the paint..." and on and on he goes. Blister the paint? I would be very proud



to build an engine that would run well whether it were painted or not.

Meyer obviously was an expert. He knew what he was talking about. And he shares his expertise with us in this incredible volume. I took one look at this and knew it had to be reprinted for machinery and steam power fanatics. Reprinting this has been very expensive, hence the high price. But you get your money's worth and more. This is something very special for connoisseurs and collectors, a must have. For the rest of us, it is a visual joy, an exploration of machinery from the glorious age of steam power. Full tilt! Get a copy of this. Put a second mortgage on your house if you have to. Seriously, if the price is too steep for you, consider putting it on charge card and paying it off in installments. But do get a copy.

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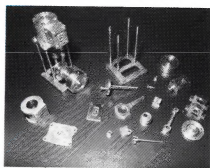
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Issue 76

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## The Cover

*Mark Mills' Case portable engine spent the whole weekend generating electricity at the 9th Miniature Traction Engine Rally at Maitland in October. A full account of the rally is to be found on page 9.*

photo by: Brian Carter

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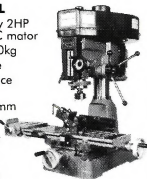


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## Comment

### A magnificent contribution to Model Engineering

Our just retired Managing Editor, Brian Carter has been involved in assisting the production of this magazine since August 1990.

He took over the complete preparation and production in mid 1993. During this period Brian introduced a new cover design and well thought out changes inside the covers. Also, Brian's initiative has made full colour features a regular part of the magazine format. His meticulous and creative approach to the presentation has seen the magazine circulation increase by over 30% in that time. While the number of Australian and Overseas subscribers to the magazine has steadily grown, most of the sales increase has been through newsagents Australia wide. In the last few years, (after years of largely stagnant membership numbers) many model engineering clubs and societies have seen an upsurge in membership. Some clubs have nearly doubled their membership. I think this is not co-incidental with Brian's stewardship and the increased sales of AME through newsagents. Thousands of new readers are now learning about our wonderful hobby, and many of these new enthusiasts are joining clubs as a result of reading about them in AME. It is fair to say that Brian has been personally responsible for swelling the ranks of model engineers in this country via his hard work in bringing us this world class publication and thus introducing many new people to the hobby.

That was the reason for AME in the first place!

However, this has not happened without a huge cost to Brian. He has completely sacrificed his leisure time, home life and his own model engineering projects for the last four years in order to produce this magazine

The good news is that Brian's active association with the magazine will continue as he will still be looking after the advertising as well as being involved in some special projects. He will also contribute the occasional article.

Brian, thank you again for your magnificent contribution.

Neil Graham

## Join us in a great hobby!

If this is your first issue of *Australian Model Engineering*, welcome!

"Model engineering" is the umbrella name for a vast range of interests that have tinkering at their core. In successive issues we cover many topics, because this magazine thrives on our readers sharing their interests throughout this range.

If you're new to model engineering as well as to AME, you may actually find *doing* model engineering can be a bit daunting. Don't let that deter you — problems like not having enough technical knowledge, or the right tool (or any), are soon resolved when you get together with other model engineers. We're good at sharing ideas and saving each other money! If you don't have any contacts, start by looking in the "Club Roundup" to find a club that's near you. Many of our readers have discovered people with similar interests literally just around the corner.

"Helping other model engineers" is the simple idea behind this magazine. About two dozen people work with me putting many hundreds of hours of work into each issue — all on a voluntary basis. We rely on our readers, including beginners, to write items for us — for the same (non-existent) rate of pay! So if you have ideas, opinions or techniques that you feel would be interesting to others, please drop us a line. We'll send you a useful guide and will gladly help with preparing artwork or editing. I hope you'll enjoy the great fellowship that makes our hobby special, and that you'll look forward to the ideas, news and camaraderie in each bi-monthly issue of AME. Most importantly, please support the people who advertise in our magazine. Without them to pay the bills, you wouldn't be reading this!

David Proctor

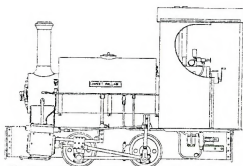


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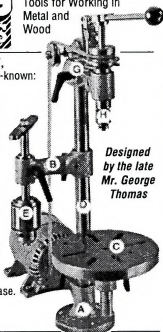
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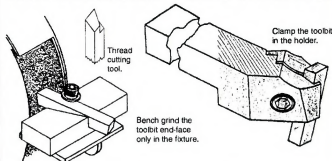
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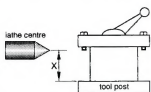
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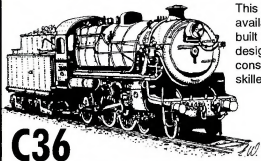


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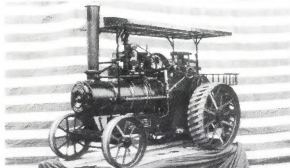
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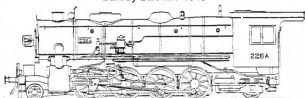
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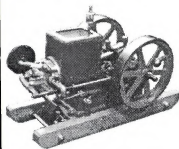
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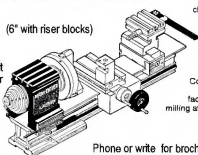
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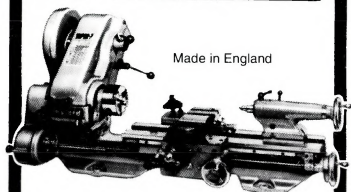
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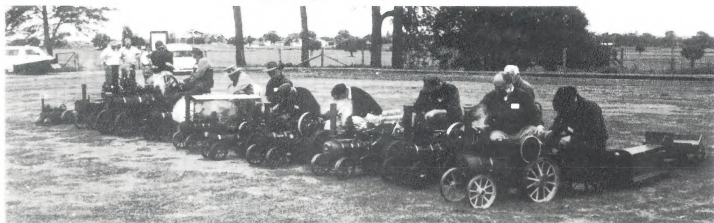
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# 9th Miniature Traction Engine Rally — 1997

Story and photos by Brian Carter



*Threatening clouds weren't enough to dampen the spirits of the traction engineers as they lined up for the Grand Parade.*

Maitland NSW — the home of the Hunter Valley Steamfest — played host to the 9th Miniature Traction Engine Rally. The event was organized by Bob Neal, giving Gordon Blake of Inverell fame a well earned rest.

Although less patronized than the 8th rally, one portable and ten traction model engines along with a full-size portable engine were enough to re-ignite the flame of agricultural steam for all who witnessed the sight of the engines ambling around the field. As with the AALS Conventions, the traction engine rallies are an ideal opportunity for like-minded enthusiasts to share their dreams and experiences.

Travel is no object for most model engineers and this event was no exception. John Levers travelled from Adelaide, Gordon Blake came down from Inverell, others came from Queensland, Coffs Harbour, Mudgee, Canberra, Sydney and Newcastle.

A feature of this year's rally was the ap-



*The service station with Bill Fowler (left engine) and Peter Smith making preparations for a busy day's steaming around the grounds.*

Engines at the Rally	
Owner	Traction engine type
Gordon Blake	Cliff and Bunting
Bob Campbell	Allchin
Lindsay Drabsch	Case
Bill Fowler	Tasker and Son <i>Little Giant</i>
John Gibson	Durham and North Yorkshire <i>Charlie</i>
Colin Jones	Allchin <i>Royal Chester</i>
John Levers	Allchin
Mark Mills	Case Portable
John Oliver	O. B. Bolton
Peter Smith	Allchin
Bob White	Cliff and Bunting

pearance of the full-size Marshall portable engine that was restored by Peter Smith and now owned by the Hunter Valley Steamfest. The slow steady thump of the exhaust as it ticked over most of the weekend was quite a delight. Mark Mills' Case portable model was setup nearby and spent the whole weekend generating electricity for the lighting effect. This model attracted a great deal of attention as it chuffed away for hours on end under the shadow of its bigger cousin.

Saturday night's feast was served in the original boiler house which also stabled the traction engines

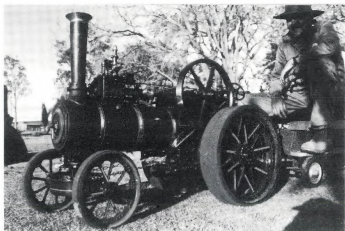
during the evenings. The meal, a scrumptious spit-roast dinner, was followed by a viewing of the rough-cut video of last year's 8th Rally at Inverell. The edited video should be ready for sale shortly — stay tuned to AME for release information.

The Saturday night "campfire" was on again as Mark Mills and Peter Smith had their engines connected to dynamos by leather belts. The steam powered campfire was enough to provide a warm glow to the outside while appropriate beverages provided a warm glow to the inside. It is usually a good yarn session and this occasion was no exception.

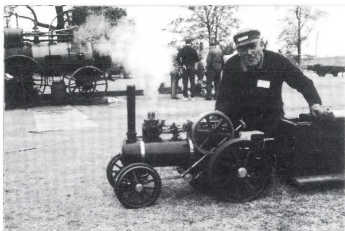
## New engines

Bob Campbell's Allchin made its debut appearance this year, congratulations Bob, may you enjoy many more rallies.

Bill Fowler's *Little Giant* first appeared at the '97 Steamfest. Bill was grinning from ear-to-ear as he drove his new engine around the field. Like Bob, Bill has been to several rallies



*Fresh "out of the box", a happy Bob Campbell takes his Allchin for a spin.*



*John Oliver tending to the needs of his O.B. Bolton traction engine.*



*A tale of two stacks — the pump house with the boiler house stack makes an impressive backdrop to the portable engine.*

but this was the first with his own engine.

### **The meeting and next rally**

The annual meeting took place at the usual time of 9am on the Sunday morning. The delegates voted for the 10th annual rally to take place in Canberra on or near the grounds of the Canberra Society of Model and Experimental Engineers. The event will be held on

the 3rd weekend in October 1998. The CSMEE members hope to organize competitions for the delegates and their engines. If you have any ideas for a competition that would be suitable please let the CSMEE members know (either directly or via AME).

### **Public awareness**

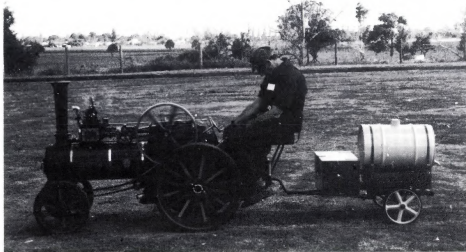
The Walka Water Works is a popular pic-

nic area for the region. This meant that plenty of the general public caught sight of the model traction engines — a real boost to this branch of model engineering. Almost all of the people had never seen anything like it before! They were amazed at the hauling power of the models and that they worked with real steam.

Several members of the public entertained the traction engineers with soccer matches on the rally field and kite flying. One kite flier had several teddy bear pilots on his kite that were released by radio control and they parachuted to the ground — much to the delight of the kids that rushed to rescue the dare-devil teddies. In keeping with the aerial theme, an old (full-size) Tiger Moth bi-plane flew overhead on several occasions.

### **Different wheels**

For those with a flanged wheel bent, the Water Works has an end-to-end 7¼" gauge railway that is about 1½ kilometers long. Each end has a turntable where the locomotive is turned and run around the train ready for the return journey. The railway follows the shore of the water storage dam. They have an 82 class petrol powered loco and a live steam C36 class. Both locomotives were in operation over the weekend.



*Is he nodding off?... no, Peter Smith is checking the water level on his Allchin engine. He's got plenty of water following him around if he needs it!*

Peter Smith and his 4½" scale Allchin set up a race with the C36 over a mutually agreed distance... the C36 won.

John Levers decided to show off the pulling power of his Allchin engine by towing his Ford Panel Van around the rally field. The Allchin performed the task with ease!

Apart from one grand parade each day, the delegates and their machines were left to amuse themselves however they pleased.

## The venue

The Walka Water works is an excellent facility and the grounds are ideal to run the traction engines. The heritage of the site provides a similar historical perspective to the rally that was first enjoyed at the Inverell Pioneer Village venue.

The Walka Water Works is the site of Newcastle's first water supply pumping station. Construction began in 1882 and was more or less complete by 1887 at a cost of around \$340,000. The main pump house building is an excellent example of Victorian Italianate architecture which represents the Pinnacle of fine Victorian buildings housing large machinery.

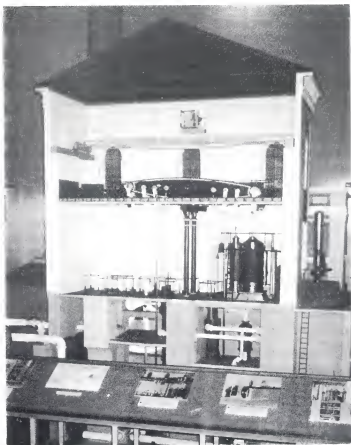
The new works was a significant advance to public health in the region by replacing the storage tanks, bores and creek barriers which were the usual practices of the time. The Water Works supplied domestic water to the Lower Hunter region between 1887 and 1929.



*John Levers showing off the hauling power of his Allchin engine by towing his van around the field.*



*Bob White easing his Cliff and Bunting past the pump house.*



*A working scale model of the Walka Water Pump.*

Population changes meant that several alterations and additions were carried out at the works during its operating life. The new Chichester dam near Dungog relieved the operating pressure of the Walka Works from 1913. Another Water Works was constructed at Tarro which, along with the onset of the Depression, put Walka on Standby from 1925 until its closure in 1929. All the plant and equipment from the Walka Water Works was sold for a scrap value of \$5000 in 1949.

Post-war electricity shortages led to the construction of a temporary power station on the works site in 1951. The Electricity Commission pulled out in 1978 and

the site was closed.

## A resurrection

The National Trust classified the Walka Water Works complex in 1976. In 1984 a trust was formed to re-open the site and restore the complex. Work is progressing at a steady pace, the main engine hall has been divided into two rooms, an exhibition room and a cafeteria. The Exhibition room has been set up with a working model of the pump that once occupied the space. There is a photographic display of the area and a continuous showing of a video of the 1955 floods. The side entry area, where E. & J. Winter had a small display of their extensive range of model engineering supplies, also has a display of tools used to service the original pumping equipment. Other small relics relating to the pumping station are on display in the room. The cafeteria offers light refreshments for the visitors.

To help raise revenue for the restoration work, the Trust hires out the two other larger halls for functions such as weddings, doll shows etc. A small fee is charged for train rides and a small fee is charged for entry into the grounds.

The buildings have been cleaned up and many gardens established and well tended. The Water Works is well worth a look if you are in the area — don't forget to take a picnic lunch!





# A New Zealand Wa Class in 7¼" g

*Story by John Heald. Photos by Murray Lane unless otherwise credited.*

After some years away from model engineering, and having built several 5" gauge British locomotives to published plans, the thought of an NZR type appealed to me. But what to build, and how to go about it? After a visit to the old Gisborne engine shed to view the restoration of Wa 165 the mind began to tick over at the possibility of this locomotive, as a model in 7¼" gauge. It would be around 1.9 meters long and if built out of bulky materials could weight up to 300 kilograms.

Would the Gisborne crew allow me to copy the necessary plans? Another visit to

match, and I had an old pattern that was used for the pony truck wheels. It was only necessary to make the patterns for the cylinders and steam dome.

The frames were made from 12 mm plate and the axle boxes were fitted with double roller bearings. The full size loco is very compact with a short fixed wheel base to negotiate tight curves. This caused problems on the model for the brake gear and springing. The original loco had leaf springs situated behind the water tanks, but the model had to have the springing which was accessible for adjustment at all times, so coil springs were slung under

inders caused a few heartaches, but it eventually all came together very well. All rods had the split brasses for bearings, but it was decided to try and fit bushes and dummy the rest. All valve gear ends are cyanide hardened and fitted with soft pins, and all are fitted with piped lubrication, as is the cross head, and valve spindle. Expansion links are made from gauge plate.

The cow catchers are typical NZ early railway, and they have to look right! All Wa locomotives built at Hillside, Dunedin had horizontal bars, while those built at Addington, Christchurch had vertical types. As with most NZ built locomotives one must pick a dated photograph to give the final details, as many changes occurred during the life of these engines, some of which were in service for 60 odd years. Mine is based on the 1925-30 period and so it is gold lined and fitted with acetylene lamps.

To help with access and placement of controls in the cab, prototype Wa 217 was chosen as she had the largest cab of the class. The cab was lengthened a further two inches and makes for a much more comfortable driving position.

The Westinghouse pump which on the original was used for air, is used for pumping water into the boiler on the model. Water can also be supplied from an axle pump, and two injectors, one 60 oz and the other 20 oz are also fitted. As most NZ clubs have now fitted vacuum braking on trolleys, an ejector was fitted for this purpose. Many friends in the railway enthusiasts field helped in research for final details, such as acetylene generators, air brake hoses and numerous other fittings. The water tanks were made from 1.5 mm steel plate and riveted as per full size practice, and are rust treated, and sealed with POR 15 sealer (made in the USA).

The design of the Walschaerts valve gear for the slide valves was modified to give 90%



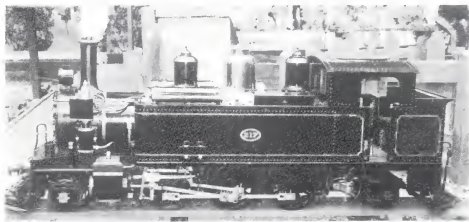
*The author empties the ash pan on his 'Wa' at the Rotorua track.*

Gisborne proved fruitful and after a donation to the restoration fund for Wa 165, I ended up with about 50 detailed plans, which enabled me to start work. I did a detailed frame drawing on cardboard (full size for the model), and proportioned the boiler, wheels and cylinder castings.

Having seen Dave Giles's design *Phantom* running on many tracks, I decided to investigate the use of this well designed boiler, as it had proved to be an excellent runner with both light and heavy loads, and with around 18 of these either built or under construction it must be pretty good. The barrel diameter was increased an inch to 7 inches, and the grate increased by 6 square inches, but the original configuration was left the same. The boiler is a round top type with a narrow firebox, and to get the model under way I got Dave Giles to make it to the modified design. It was also found that the *Phantom* drivers had the right number of spokes and the diameter was a near

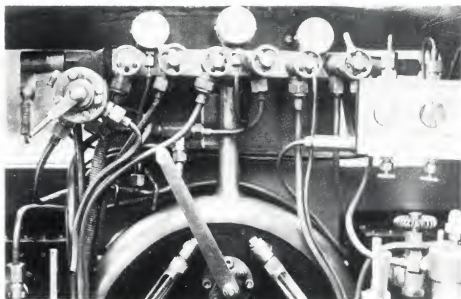
the axle boxes, and are difficult to see once on the track.

No major problems were faced, although the design and appearance of the finished cyl-



*The 'Wa' stands in steam ready for another run*





Where the action is! Driver's eye view of cab fittings. Note displacement lubricator on the right.  
photo by J Heald

cut off in full gear, by lengthening the valve spindle travel. The minimum cut off is about 30%. The exhaust beat in full gear is very loud and turns heads when the engine is under full load. The only major problem during the first steam up, was with the steam regulator valve. I had made a taper type, which fitted beneath the steam dome, as I could not obtain a small enough teflon ball valve. This proved troublesome, and after much thought a plumbing ball valve was fitted which was small enough to get inside the boiler, and sit beneath

the steam dome. This has worked well to date with no problems.

The first track run was at the Manukau Live Steamers at Auckland in June 1996. It has proved to be the best locomotive I have built, with no vices to speak of. Load tests were carried out at the Havelock North open weekend in October 1996 and an estimated 2.8 tonnes were pulled round the track with no wheel slip occurring at all. I believe if firing is modified she could well haul about 3.2 tonnes on this track, or about 4 tonnes on a level

track. This equates to about 7 to 9 fully loaded passenger cars. I was quite staggered at this figure but Dave Giles, assisting with this exercise confirmed what the engine pulled. This is a credit to the early NZR locomotive designers, as the full size locomotive, although small could produce 14,000 lbs of tractive effort. I understand that most NZR locomotive plans are available from Tranz Rail, being stored on microfilm, and the costs are reasonable. Time to build was 2 years 4 months.



## NZR Wa class 2-6-2T

### Specifications

Gauge	7 1/4"
Length	72"
Width	18"
Height	25"
Wheel Diameter	75 1/2"
Weight	410kg
Cylinders	2 1/8" x 3 1/4"
	bore and stroke
Boiler	Copper
Boiler length	31"
Boiler diameter	7"
Tubes	13 x 2 1/2" x 5/8" OD
Flues	3 x 2 1/2" x 1" OD
Superheaters	3/8" OD stainless
Boiler pressure	100 psi
Grate area	39.3 sq.in.
Tank capacity	28.2 litres

# NZR Wa class 2-6-2T Locomotives

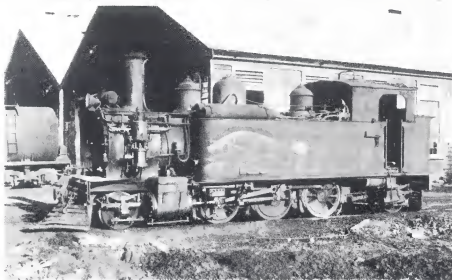
by Murray Lane

The NZR class 'Wa' goods tank locomotive entered service in 1892. It was very similar to the earlier 'W' class but had driving wheels some 2 3/4" larger in diameter. An initial batch of five engines were produced by the Addington Workshops between 1892 and 1896, and were fitted with spare 'J' class boilers. The final batch of six were made at the Hillside Workshops between 1897 and 1903.

The first six locomotives had D valves and single slide bars, with the next two having Laird crossheads and two guide bars. The final three had piston valves and alligator type crossheads. No two locomotives were the same when built and subsequent overhauls and modifications further changed each of the locomotives over the years. A final four engines classified 'Wa' were converted from 'J' class 2-6-0 locomotives during 1917-18, but

they bore no resemblance to the original NZR 'Wa' class.

These nicely proportioned tank engines were modest performers, rated to



Wa 165 at Frankton Depot, Hamilton in July 1953

photo by Jack Creber

haul up to 470 tons on a level track and 70 to 80 tons on 1 in 35 gradients, and were initially used around the Wanganui area. By 1910 they were scattered around the North island with one in the Gisborne area and two in the south of the South Island. A further two were allocated to the Gisborne region where they were ideal for use on the heavily graded sections around the area.

The decline of the 'Wa' class started around 1929 and by 1956 there were only two in service in the North Island and three in the South Island, where they were still doing useful work in the Grey-

mouth area. All had been withdrawn by 1962.

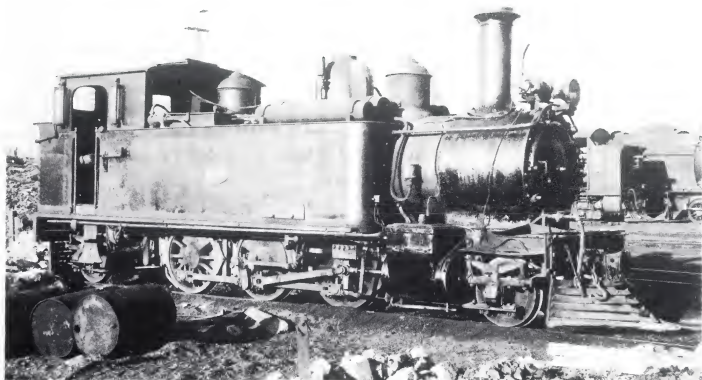
Wa 67 was sold to the Castlecliff Railway at Wanganui around 1942 and Wa 220 to the Napier Harbour Board in 1948. Both locomotives were scrapped when the NZR took over these lines. Wa 68 was sold to the Napier 30,000 Club and was on display on the Marine Parade in Napier for some years, before being broken up due to severe corrosion from the salt atmosphere.

Wa 165, one of the original six engines, had a varied life and worked in most of the North Island areas during its

active life with the NZR. In 1961 it was sold to the Gisborne Chamber of Commerce and remained on display at Gisborne for many years. Around ten years ago a group of enthusiasts formed the Gisborne City Vintage Rail Inc., with the aim of restoring this engine back to working condition. One of the major hurdles involved the design of a new boiler, as the old original 'J' boiler was beyond repair. A newly designed all-welded boiler was made by the Dispatch Foundry at Grey-mouth. It is hoped that Wa 165 will be in steam by the end of 1997.

## Specifications

Class	Number	Weight (tons)	Bore x Stroke	Driving Wheel Dia.	Boiler Pressure	
W	192 & 238	36.9	14" x 20"	36.5"	170 psi	
Wa	64, 67, 217, 220, 275, 165 288, 289, 50, 68, 137	36.7	14" x 20"	39.75"	170 psi	Single guide bar & slide valve Double guide bar & slide valve Double guide bar & piston valve 3 numbers unknown
ex J	262 (plus 3)	42.5	14" x 20"	42.5"	160 psi	



Another view showing the other side of Wa 165 at Frankton Depot, this time in May 1954.

photo by Jack Creber

AME Magazine...

Reading about it is the next best thing to doing it!

# Steam Chest



with Dave Harper

Hello again, steam fans, and welcome to another selection of steamformation. It seems terrible writing for the Jan 1998 issue already; where did 1997 go?

Following my plea for stuff on beam engines, Rex Bridges has sent in an article on his model Cornish pumping engine, which hopefully, our dear editor will find room for in the not too distant future. Also, thanks again to Dave Sampson and his library. I've been reading about the amazing variety of beam engines that were produced over a period of at least 200 years. One book in particular, *Steam Engines and Waterwheels*, by F D Woodall, has a load of old photographs of pumping engines, winding engines, and some that did two or three different things at the same time!

If anyone has any other references to beam engines, I'd be glad to share it with our readers, as they seem to be a sadly neglected subject.

## Big Is Better

There seems to have been a period between about 1880 and 1910 when stationary steam engines reached their zenith regarding size and efficiency. The classic engines at Spotswood date from this era, as do numerous preserved examples in the UK. Engines were built on a huge scale in the USA, too, it seems. I recently acquired a book about the copper mines in Michigan, on the banks of Lake Superior. Called *Cradle to Grave*, by Larry Lankton, the book tells the story of how an incredibly rich ridge of copper ore that juts into Lake Superior was mined by numerous companies, in particular the Calumet & Hecla Mining Co., who operated the largest and most advanced mining and smelting works of its time.

Being situated in such a remote area the company had to provide everything for its workers — houses, schools, churches, stores, etc., and literally looked after its workers from cradle to grave.

Around the turn of the century Calumet & Hecla installed what were the largest steam engines in the world. In 1874 the president of Calumet & Hecla, Alexander Agassiz, took on Erasmus Darwin Leavitt as engineering consultant. Agassiz believed that it was more efficient to have a few large steam engines driving many things than lots of small en-

gines. Accordingly, he tasked Leavitt with producing engines to his requirements.

By 1877 Leavitt's third engine was rated at 1,000 hp and drove four 24ft hoisting drums, a pair of air compressors plus rock breakers and sundry other machinery. His fourth engine became one of the company's most recognised symbols of technological prowess, and was called 'Superior'. Completed in 1881 it was touted as the largest stationary steam engine in the world; cost nearly \$100,000, weighed 700,000 pounds (317.8 tonnes) and produced 4,700 hp, of which 2,700 was considered its normal load. The engine drove four winding drums 20.5 feet in diameter which could hoist from a depth of over 4,000 feet. Running at 50 to 60 RPM, the engine also turned two flywheels 32ft in diameter which served as drive pulleys. Each of the 45 ton flywheels drove a 30 inch wide belt that took power from the engine for many different purposes. In addition to winding from four shafts, the Superior engine, through belts, gears or wire rope transmission, powered the surface tram road, two large air compressors, two mine pumps and two man-engines. Power from the engine travelled as far as 2,000 feet along the mine site before being applied.

By the late 1890s, C & H had at least 50 stationary steam engines at the mine, including a 7,000 hp triple expansion engine, plus more at its mills and smelters, along with a stable full of steam locomotives. Its stationary engines alone totalled about 50,000 hp.

At the mine, this power was distributed to some 40 major structures. It drove machinery at eleven three-storey tall shaft-rockhouses standing in a line along two miles of the Calumet conglomerate lode. It ran a mill for sawing, morticing and tenoning 13 million board feet of square-set timbers per year and served carpenters shops equipped with every wood-working appliance — several large blacksmith shops housing steam hammers and forges; a large shop for forging and sharpening drill steels; and a 'mammoth' machine shop filled with every kind of metal working machine. The later winding engines could hoist 8 or 10 ton loads of rock at up to 3,500 ft per minute from depths of up to 5,000 ft.

The chapter on steam power goes on and on describing the development of machinery from the earliest man-powered winches to the

monsters just described, fascinating reading (for me, anyway!)

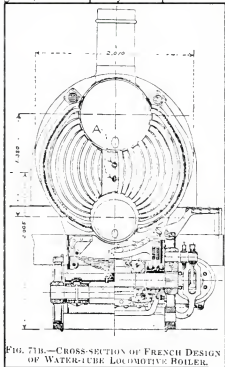
The shaft-rockhouses mentioned evolved to protect the mine head workings from the terrible weather experienced there, and contained the hoisting gear as well as the rock crushing machinery which broke the ore down so the copper could be extracted. In 1875 the Quincy mine broke 72,000 tons of rock to produce just over 1300 tons of copper. In 1908 Quincy's latest shaft-rockhouse was 150ft tall, housing its own 2,500 hp steam engine which raised the rock, then tipped, broke, crushed and graded the rock until it was finally tipped into railroad cars. Three men on the crushing floor could process 1,000 tons of rock per day.

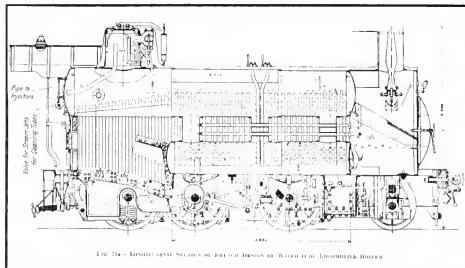
Sadly, none of these magnificent machines exist today. The last of them were apparently broken up for scrap at the beginning of the second World War. However, I'm sure that somewhere out there someone has some pictures or drawings of at least some of these giant steam engines; there are only a couple of photos of them in the book, so I'd love to hear from anyone who can supply more information!

## Bizarre Boilers

I seem to have done well on books lately; John Strachan (of Hobby Mechanics) kindly loaned me some old books recently, among them was one called *Steam Boilers* by W H Fowler. It has no date but seems to be around 1920 by its references to British Pre-Grouping railways.

The chapter on Locomotive Boilers was interesting in that it showed some late developments, particularly by the French, to increase efficiency by using very high pressures in water-tube boilers. I'd heard of a British Yarrow-type boiler on a loco, but it was nothing compared to the French design in the diagrams, which hopefully will reproduce well





enough for publication. There are numerous other examples but none quite so bizarre!

Commenting on the use of steam domes on loco boilers, the author quoted the following remarks made by Mr C E Wolff, Bsc. - 'When a boiler primes it is nearly always due to certain salts, notably sulphates, concentrating in the water, which causes it to foam up like boiling milk. Oils and greases have a similar effect, as also anything which tends to form a scum on the surface of the water. Now, in the case of a boiler having a dome, there is a strong current of steam flowing towards the opening in the dome, which tends to make the scum and froth accumulate underneath the opening for the dome, whence it easily carried into the steam pipe. On the other hand, in the case of a boiler with a steam-collecting pipe extending all along the top of the barrel the steam is collected quietly along the whole length, and no such strong currents are set up in the steam. There does not, therefore, appear to be any very good reason to expect the steam to be drier in the one case than in the

other, and this seems to be borne out in practice. When a locomotive boiler primes the fact is advertised by a black deposit of soot on top of the boiler, and the domeless engines of the Great Northern and South-Eastern Railways always appear very free from this blemish. Again, the Doncaster water used to be about as bad from the point of view of priming as any in the country, and the only engines which appeared to give no trouble with it were those of the Great Northern Railway which had no domes. On the other hand there are plenty of locomotives fitted with domes which give no trouble by priming, and it would seem that boilers can be constructed to work equally well on both systems.'

Not being a loco (or even stationary) boiler operator, I don't have any opinion on the subject; it just seemed an interesting point that may generate some discussion.

### Red Fred Takes Shape

The body of Red Fred the railmotor is taking shape, basically a woodworking exercise so far. I am following the Tram Loco articles with great interest as my power van will be very similar. Also it seems that I will be able

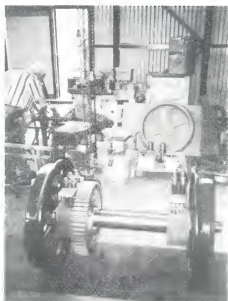


Photo 3



Photo 4

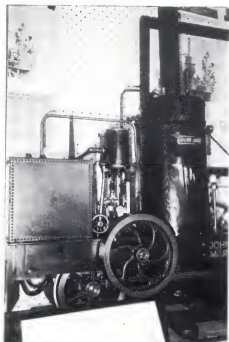


Photo 1

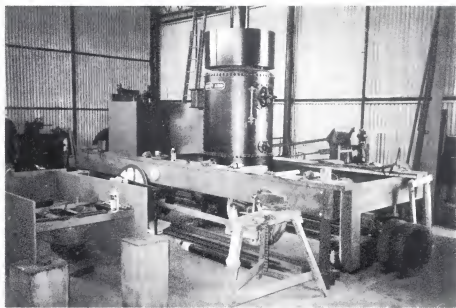


Photo 2





Photo 5

to get the rear disc wheels cast in aluminium once I come up with a satisfactory pattern. Another problem solved! Pictorial evidence will follow when I finish the film!

### Mary Ann Takes Shape in Maryborough

During my trip to Maryborough a couple of years ago (see *Maryborough Odyssey*, Nov/Dec 1995...Ed), Peter Olds told me that it was planned to build a full-size replica of Mary Ann, the first steam loco built in Maryborough, to be operated as a tourist attraction. Just recently I met Peter Knight, the new Myford agent in Brisbane, and he mentioned that he had seen the replica under construction in the Olds workshop, would I like to see some photos? You bet! So he kindly sent me the photos shown here.



Photo 6

Photo 1 is a close-up of a 5 inch gauge model built by Peter Olds some years ago. Photo 2 shows the replica frame and boiler shell. Peter Olds told me, when I phoned him about it, that this shell is an old riveted boiler, and a new steel boiler barrel will be fitted inside. The shroud around the top is some form of feed-water heater. Photo 3 shows the driving wheel assembly and photo 4 shows some of the many patterns and castings required for a project like this. Note the crankshaft in the background which reveals that the replica will have a two cylinder engine. (The preceding four photos were taken by P.Knight).

### Travels With Kenny

Last issue I left you after a freezing first night out at Eidsvold.

Day 2 saw us in Mount Morgan where we took the tourist bus around the old mine site, now a huge lake full of putrid water with a few interesting bits of gear scattered around. After that we took a ride on the little steam



Photo 8

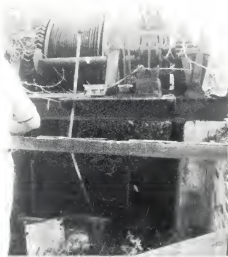


Photo 7

train that runs on the old branch line into the town. Photo 5 shows the little loco being watered before our trip.

Night two was at one of Kenny's mate's place in Rockhampton; day three we stopped to look at the Hay Point coal terminal near Mackay. The scale of the operation is quite mind-blowing, all visible from an excellent look-out on top of the hill.

After a night at Proserpine we headed inland to Ravenswood, an old mining town south east of Charters Towers. Here we were lucky enough to meet one of the great characters of the area, Percy Kean. Now 83 years old, Percy, in 1947, re-opened an old silver mine at Totley, just outside Ravenswood. To power the mine, Percy bought a huge M.A.N. diesel engine and generator, plus all the mine-head gear, from a derelict mine way up on the Palmer River. Percy dismantled the whole lot, loaded it onto an old ex-army truck and drove it across country to Chillagoe. There it was loaded onto a train and brought down to near Charters Towers. Percy trucked it the rest of the way and rebuilt it at Totley. This was in

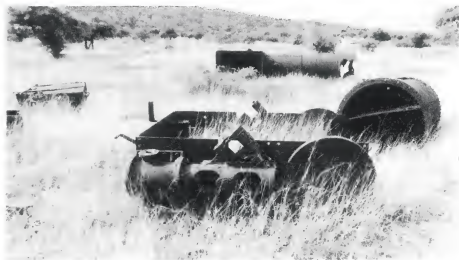


Photo 9

1947, and the engine had been installed originally in 1912! However, he got the engine going and actually worked the mine for a cou-

ple of years before the price of silver fell so low it was no longer viable.

Photo 6 shows Kenny admiring the overgrown remains of the M.A.N. diesel, **photo 7** is of the original 1912 vintage electric winding gear; note the huge rheostat underneath! To extract the silver from the ore Percy also built a ball mill, seen in **photo 8**. The chimney stack had us puzzled until Kenny recognised it as the furnace tube from a Cornish boiler!

Scattered around the mill in the vicious spear grass were numerous remains of old steam engines including the bits shown in **photo 9**, a twin cylinder winding engine and a boiler in the background.

That seems more than enough for now, until next time, happy steaming!

<http://www.ameng.com.au>

...now there's a site to visit!

## John Millman's Models

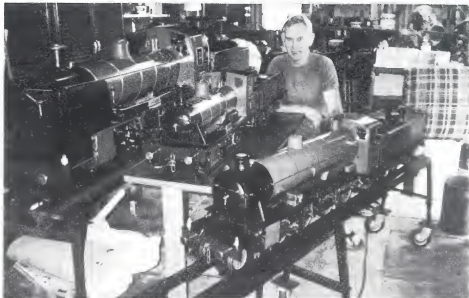
by Jack Stanbridge

John Millman drove 12-to-the-foot scale locos in the UK for 20 years — nine with steam on the GWR, then eleven years on the Midland region of British Railways. He joined the Castledare (Perth) club in 1979. His story shows that you don't have to be a youngster to be a beginner in model engineering, and it helps to have friends!

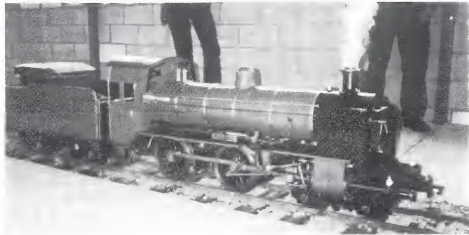
John was a 49-year-old with no engineering background at all when he joined our hobby. With an old Myford lathe just purchased, a drill press and a few hand tools, he started on a 5" gauge Simplex with a tender. After three years and an enormous amount of advice from model engineer friends, it was completed and ran quite well — a source of much enjoyment.

Flushed with success, John became adventurous and built a Martin Evans designed 5-inch gauge *Sir Nigel Gresley* in two years. It proved an exceptionally good runner, and has done a lot of work at club meetings and fetes around Perth.

Like many in our hobby, John got a taste for bigger things as his experience grew. For his next loco he bought some 7/4" gauge bogies, tender and driving wheels made by the late George Shand in Queensland about 30 years ago. To make these items into a freelance 4-4-0, John had to use other members' facilities to machine the larger components, but he was still able to handle the smaller parts on his ancient Myford. The 2.4 metre long loco has nine drivers and a 28-tube 2-superheater copper boiler 36 inches long and 8 inches in diameter. Completed over two years, *Phoenix* was very stiff at first but after six hours of running it started to gallop along!



John Millman (above) with his three locos and (below) 'Phoenix', the 4-4-0



# "Where's The Rest Of It?"

## The Klug Valve Gear of the Orenstein and Koppel Company

by Geoff Murdoch

Photos by Geoff Murdoch and drawings

prepared for publication by Neil Graham

From time to time I have been asked to explain the "funny" valve gear previously used on some of my locomotives. So, the following is a description of a simple yet effective valve gear as used by internationally recognised manufacturers of prototype locos over many years and also used with great success by yours truly on both 5" and 7 1/4" gauge live steamers.

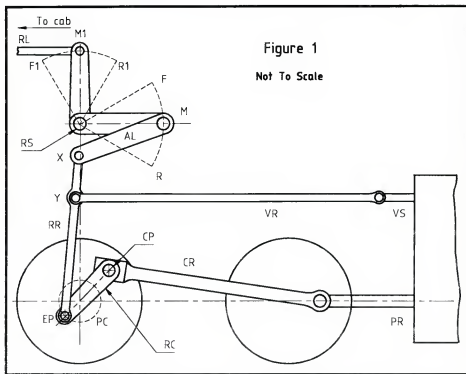
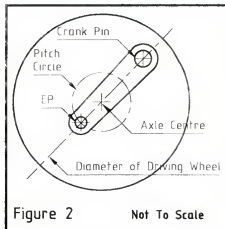
### A little history.

The valve gear was used extensively on narrow gauge and industrial type locos built by Orenstein and Koppel (O&K) in Germany. Examples of some of the locomotives utilising this valve gear in Australia were the 0-4-4-0T Mallets which ran on the two foot gauge Magnet Tramway in Tasmania. The first time I saw the valve gear was in 1971 on the 0-4-4-0T (ex-Boulder, WA; ex- Magnet, Tas) Mallet which was sitting forlornly on a short piece of track at Whiteman Park, West Australia. Enquiries as to the origin and the name of the unique valve gear found that the various sources of information all differed.

### What's in a name?.

Internationally it was known as O&K valve gear. One source (Industrial Railway Record No.40, Dec 71, Page 161) quoted that it was patented in 1900 as their own valve gear. Further discussions with a learned gentleman in WA determined that it was known as Marshal Valve Gear — the name I openly accepted and used from that day on.

However, over the passing years I became increasingly skeptical of the Marshal name, as the valve gear used by O&K bears no resemblance to any drawings, descriptions or operational Marshal valve gear (usually associated with traction engines) that I have seen. The best drawing and description (recently pro-



vided to me by a friend) that I have seen to date, refers to the valve gear as *The Klug single eccentric reversing gear for locomotives*. (The Model Engineer and Amateur Electrician Nov 1, 1901, page 210).

Without any further confirmation, one may be forgiven for assuming that *Klug* was the name of the person behind the design of the valve gear and that the person in question had contacts or possibly employment with either Arthur Koppel or the Orenstein brothers (Max or Benno). Therefore the question may be asked, "Do we adopt the name O&K or *Klug* as the more appropriate name?". I suspect it would be more prudent to adopt the internationally recognised name of O&K valve gear. However, to alleviate any confusion when discussing either O&K-the-company, or O&K-the-valve-gear, I'm sticking with *Klug*.

### Introduction

From Figure 1 it can be seen that the *Klug* valve gear has no combination lever and no expansion link, both of which are readily associated with Walschaerts valve gear. However, the entire motion of *Klug* is still dependant upon a pitch circle created by a return crank. The difference being that the *Klug* return crank is neither leading nor trailing. Instead it is set in such a way that a centre line drawn through the crank pin and the eccentric pin lies directly over a line repre-

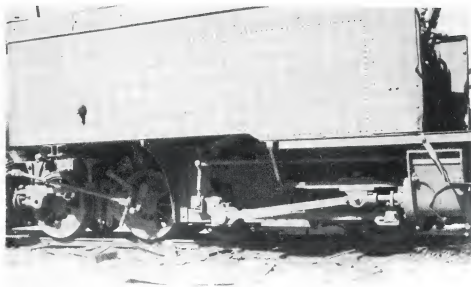
senting the diameter of the wheel. (Figure 2). A vertical centre line drawn through the axle and the reverse shaft is at 90 degrees to the exhaust port face and valve spindle.

### Description

Forward and reverse are selected in the conventional manner by positioning RL on the cab reversing quadrant. Shaft RS is supported in a fulcrum on either side of the frames. Levers RSM and RSM<sup>1</sup> (Figure 1) are permanently fixed to RS at 90 degrees but at the same time can be rotated through arcs FMR

### Legend of Abbreviations

RL	Reversing lever
RS	Reversing Shaft
AL	Anchor Link
RR	Radius Rod
VR	Valve Rod
VS	Valve Spindle
RC	Return Crank
PR	Piston Rod
CR	Connecting Rod
PC	Pitch Circle
CP	Crank Pin
EP	Eccentric Pin
VT	Valve Travel
F	Forward
R	Reverse
M	Mid-Gear

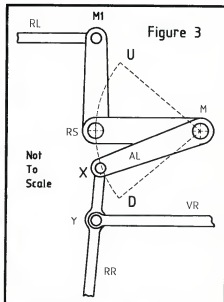


A general view of the rear engine unit of the 0-4-4-0T Mallet described in the text, fitted with Klug valve gear. Note the main connected rod for the front unit has been removed and the radius rod has been left hanging. This locomotive is located at Whiteman Park W.A.

and  $F^1M^1R^1$  to select full forward or full reverse. (Notching-up selects a position somewhere in between). When in motion, radius rod (RR) is driven by the eccentric pin (EP) which follows the pitch circle created by the return crank. RR in turn drives the anchor link (AL), which is pivoted at M, to create the arc UXD as shown in Figure 3. Valve travel is derived from the valve rod (VR) positioned on the radius rod at Y which converts the oscillating movement into reciprocating movement. The distance of Y from X on the radius rod determines the lap and lead. When in mid-gear, RSM must be parallel to the valve spindle (VS) and as with Walschaerts valve gear, the valve travel is equivalent to lap and lead. The movement of point Y in mid-gear is approximately oval shaped (Figure 4) and when in full gear the oval shaped movement of point Y becomes elongated to impart the required valve travel. Figures 5 and 6 show the

elongation when in full forward and full reverse.

Ideally the horizontal centre line of oscillations about point Y should be in line with the centre line of the valve spindle (VS). In practice a small amount of offset between the two centre lines can be tolerated without undue effect on the valve events. However, should the offset be too great the solution is simple. Extend VS rearward so it slides back and forth in a bush attached to the motion plate. Determine the amount of offset between the two centre lines and make an arm of equal dimensions to the offset. Attach the arm to the extended valve spindle and connect the valve rod to the top of the arm (Figure 7). This restores both the horizontal centre line of oscillations about point Y and the centre line of VS to a parallel situation which will in turn correct valve travel errors. Also, it is better if RSM<sup>1</sup> is as long as practical.



### Setting the valve gear

The process is almost identical to that of setting Walschaerts valve gear. Ensure the return crank (RC) is positioned exactly as previously described (Figure 2). Position the lever RSM parallel to the valve spindle (VS) and mark this position on the cab reversing quadrant to be used for future mid-gear selection. Lock the reverser in this position. With the valve chest removed, turn the entire motion and observe that the valve travels the same distance either side of the port face centre line (Figure 8). Use the inlet ports as a guide. If not equal, adjust the valve position on VS and repeat the process until equal travel is reached and lock the valve on the valve spindle. Next, adjust RS towards full forward. Again turn the entire motion and observe (or measure) that the valve travel in each direction is equal. Repeat the process by adjusting RL until the inlet ports are fully uncovered in each direction and mark this position on the reversing quadrant as being full forward. Repeat the entire process for full reverse. If there are differences in each direction of the valve

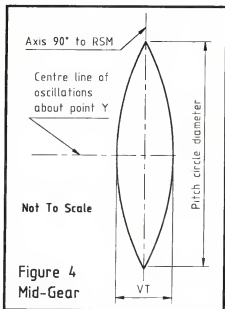


Figure 4  
Mid-Gear

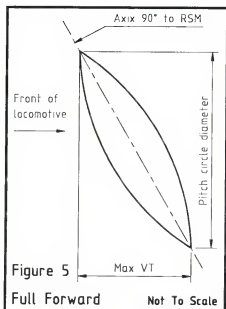


Figure 5

Full Forward

Not To Scale

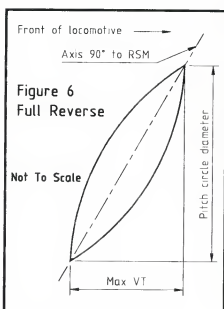
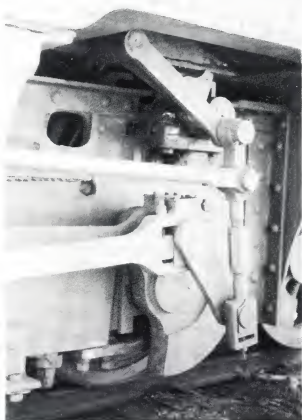


Figure 6  
Full Reverse





A closeup of the valve gear on the Mallet. Note the turnbuckle on the Radius Rod (RR) unique to the Klug Valve Gear. No doubt to fine tune the valve events of the engine.

travel in either forward or reverse, slight adjustments of the valve on VS may be made to get the valve travel in either direction as close as possible to being equal. If there are differences between forward and reverse, carefully adjust the valve on the valve spindle to favour forward gear (or the direction of travel that will be most used). A little bit of persistence gets it right.

**Note:** The greater the arc FMR becomes (Figure 1) when selecting full forward, the greater the chance of RR and AL becoming closer to a straight line, particularly when EP is closest to the rail. The straight line condi-

tion will put unnecessary stresses on points X and M. Therefore, as with any other valve gear, attention to detail is paramount when setting-up.

## Efficiency

Being no more than a self taught experimenting doer of mechanical things, I cannot provide calculations to show comparisons in efficiency between Klug, Hackworth, or Walschaerts valve gears. However, having converted a Hackworth valve gear loco to Klug, the improvement was noticeable both in starting and notching-up. This in turn reduced water and coal consumption.

I was also fortunate enough to drive a loco of the same type which had been converted from Hackworth to Walschaerts and the improvement was more noticeable than on my Klug conversion. Notching-up with Walschaerts was also better than with Klug.

Therefore, the conclusion may be made that the efficiency of Klug lies somewhere between that of Hackworth and Walschaerts. Given the success I have had with

Klug it would be interesting to find out exactly where it lies.

## Disadvantages

All valve gears have varying levels of disadvantages caused by axle box vertical movement while running over bumps and dips in the track. The vertical movement is passed on to the valve gear, which in turn alters valve movements to the detriment of efficiency. Although valve gears such as Hackworth and Klug suffer more so than others, the disadvantages can be reduced.

Instead of the reversing shaft being positioned in bushes in the frame, alter the reverse shaft fulcrum point by either machining a new axle box or by bolting a chair or riser on top of the axle box, thus creating a reversing shaft fulcrum point which maintains shaft RS at a fixed distance from the axle centre line. RS then moves up and down with the axle box and the fixed relationship will reduce, but not eliminate, changes in valve travel due to track imperfections. The holes in the frame which were previously used as the reversing shaft fulcrum points will need to be machined into slots and widened to allow for friction free vertical movement of the setup. Whether a chair or riser is used or not, stiff springing on the driving axle box is recommended.

## Aesthetics

Without doubt the motion of the Walschaerts valve gear in operation is the most pleasing to watch, whereas the scissors type operation of Hackworth and Klug valve gears may not appeal to some. So it's just a matter of choice depending on the taste of the individual.

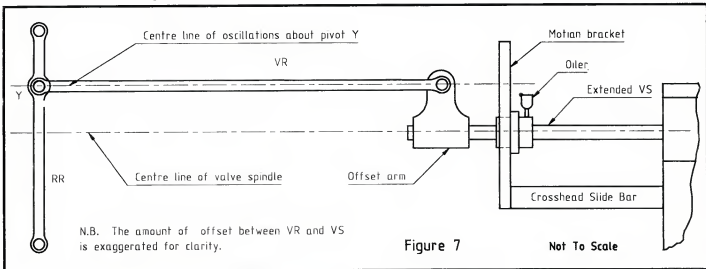
Either way, the enjoyment of operating a steam engine is still there!

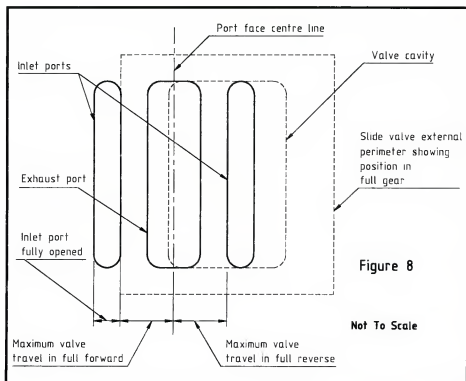
## Advantages

It is immediately evident from Figure 1 that there are fewer rods and levers to make. Therefore, cost and building times are reduced and it gets you on the track quicker.

For those who wish to build more than one locomotive, the following may come in handy.

Klug valve gear of given proportions, already in use on one locomotive, can be transferred to another locomotive having the available clearances to accept it. The transfer can be done either directly without dimension changes or by simply scaling up or down using a multiplication factor suitable to the situation. Because there is no combination lever to redesign, the transfer can take place irrespective of different wheel diameters or piston stroke dimensions. The proviso for direct transfer without dimension changes is that the valve, valve ports and pitch circle remain the same. Should the valve ports on the new or





receiving loco be already machined to different sizes from the original design, work out the multiplication factor between the old and the new and apply it to all dimensions of the valve gear. What could be simpler!

### Maintenance

Because *Klug* valve gear consists exclusively of levers oscillating in arcs about pivots, all that is required to return the valve events back to original is to return the bushes to their original dimensions. Simple but effective

and in minimum time. Would this make it ideal for a club loco?

### Stimulus

Should you be interested in using *Klug* valve gear, the following is a list of imperial dimensions which were used on a freelance 0-4-0 loco I loosely referred to as *Krauss*.

Inlet ports: 0.1875"  
Exhaust ports: 0.375"  
Valve length overall: 1.395  
Valve cavity length: 0.75

RR length: 3.1875  
XY: 0.8215  
RC: 1.6875  
PC diameter: 1.000  
Piston stroke: 2.375  
RSM: 2.375  
AL: 2.375

Vertical distance between axle centre and reversing shaft centre: 3.1875

Wheel diameter: 4.375

Valve travel: 0.594 (Refer to the Note at the end of 'Setting the valve gear'.)

Crankpin throw: 1.1875

The dimensions RSM and AL being the same as the Piston Stroke is purely coincidental.

### Conclusion

*Klug* valve gear has given me a lot of enjoyment because of its simplicity and reliability. As an example, some members of both the Wagga Wagga and Hornsby district societies witnessed a *Klug* valve gear 2-6-0T I built, haul the late Bob Sanderson's consist of concrete stabilised carriages fully loaded with passengers (from a standing start under the footbridge at Cutchers crossing) up the 1 in 80 incline of the Galston track. The safety valves were blowing off on reaching Rabbit Flat. At the time this took place, I was lead to believe that this was the first conventional rod engine to haul this configuration. Normally Bob's geared Shay was the only loco capable of moving the load.

I attribute the feat not to my self taught efforts, but to the efficiency of the *Klug* valve gear which; when viewed for the first time, draws such comments as:

"Where's the rest of it?"



## Notes on Ball Valve Seats

### Hints of Peter Dawes

Theoretically, the ideal point of contact where a ball should sit on its seat is when the tangent to the ball circle at that point makes an angle of 45 degrees with the long axis of the valve. That angle is obtained when the diameter of the seat is  $\sqrt{2}$  or 0.707 times

Now of course they don't have to be accurate to three decimal places! To the nearest 10% will be quite OK and the 3rd column shows some acceptable standard sizes.

The fourth column is the bore of the valve body over the ball. Main Bore and is calculated so that the annulus around the ball has the same cross sectional area as is provided by the seat diameter - according to the formula:-

$\sqrt{ds \times db}$  where:-

ds = diameter of seat,

db = diameter of ball,

D = Main Bore.

Because the flow around a ball is quite complex, equating the area of this annulus with the area of the seat is only an approximation to actual flow rates. So this figure is intended only as a guide to builders to get the two bores in proportion.

There may be reasons for choosing another main bore diameter for the body of the valve -

eg. for pop valve characteristics but I don't want to get into that subject. Either way, old timers tell us to ream the hole for the seat and the reason is to ensure absolute roundness, because non-circular seats are the major cause of leaking ball valves.

There are two schools of thought about finishing the seat. One is to leave the edge sharp and let the ball make its own seat. On the other hand, some say you should use a plain steel ball of the same diameter as the stainless steel ball that is to be used finally, and give it a single sharp tap to form the seat. That gives a narrow facet on the corner. This allows you to inspect the actual seat with a magnifier to see if the facet is complete and uniform all round, for if it isn't, the seat is not round or you hit the ball off-axis. The actual construction of ball valves is something for a later time or for someone else to deal with.

Ball	Seat	Nearest Size	Main Bore
3/16"	.1325"	#29, 3.4mm	.230"
1/4"	.1767"	#16, 4.4mm	.306
5/16"	.2209"	#2, 5.6mm	.383
3/8"	.2651"	17/64, #H, 6.7mm	.460
5mm	3.53mm	5mm, #29	6.12mm
6mm	4.24	4.2mm, #19	7.34
8mm	5.65	#2, 5.7mm	9.79
9mm	6.36	1/4", 6.4mm	11.0
10mm	7.07	#1, 7.1mm	12.24

the diameter of the ball. So for a few typical ball sizes we can calculate Seat diameters as in the table.

# Time by the Sun

## A Simple Equatorial Sundial

by Ken William

*photos and drawings by the author*

Sundials have been used to show the time for at least 2500 years, and even today have surprising accuracy if correctly designed for a specific location. My design of dial is easily constructed using only normal workshop hand tools and has all adjustments required to ensure accurate performance at any site.

The common factor for most dials is the provision of a fixed object known as a gnomon which casts the sun's shadow on to a graduated surface. The most familiar arrangement is for the gnomon to be a vertical plate the top of which is aligned with the earth's axis and casting a shadow on a horizontal plate marked in hour intervals. Horizontal dials of this type are common in garden shops but are usually only decorative as a dial can only be accurate if the gnomon is precisely set to the site latitude. With stock patterns this is seldom the case.

### Sundial Basics

When the gnomon shadow falls on a graduated circular plate or ring which is set parallel to the equator the dial is known as an 'Equatorial' and **Figure 1** shows how an equatorial dial relates to the site latitude and to the North-South axis. If the dial is to read Standard ('clock') Time the exact site longitude must also be determined.

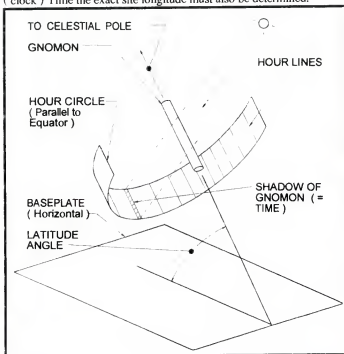
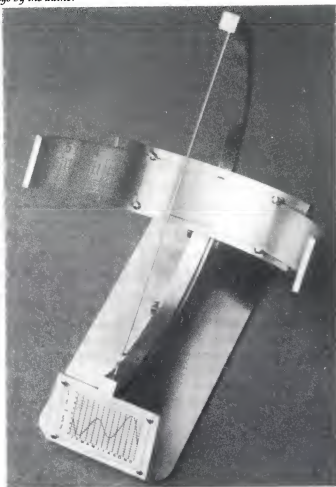


Figure 1

During the period when the sundial was used as standard time-keeper the noon mark was in line with the gnomon and when the shadow touched the mark it indicated that the sun was directly on the North-South meridian, this was noon ('Sun time').

### Standards of Time

By the 1880's commercial demands such as the necessity for railway timetable synchronisation made standardisation of time between adjacent areas essential and an international conference in 1884 set up a time zone system. Based on the longitude of Greenwich the world was divided into zones in which the standards time of each was to be based on a selected time zone meridian. This system is used today with only minor variations and international time in the cases of com-



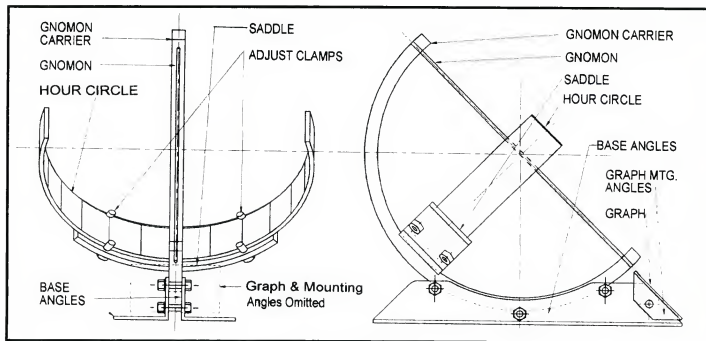
Close up of the completed sundial. Note the graduations on the Hour Circle

munication and navigation is stated in 'GMT' (Greenwich Mean Time). Zone difference is one hour for fifteen degrees of longitude. If the dial location is ten degrees west of the Time Zone meridian and it is required to read Standard Time, the plate or circle with hour graduations needs to be moved to displace the noon mark 40 minutes west of the sun time noon mark. Adjustment is the opposite in the case of an easterly variation. For reading correct time during daylight saving a similar temporary shift is required.

### The Equation of Time

The inclination of the earth's orbit around the sun causes the seasonal variation in the length of day. The hours of our watches and clocks show a mean value and the difference between mean and sun time is known as 'The Equation of Time'. The actual value of this factor for each day varies slightly as the calendar is adjusted for leap years but the variation is usually within about a minute and is commonly ignored. If the precise figure is required tables are available in the *Nautical Almanac* which is published each year.

**Figure 2** is an Equation of Time correction graph suitable for the dial detailed later. A photocopy laminated with plastic film can be used directly or alternatively a copy can be commercially embedded in clear plastic. Fixing screws should receive weatherproof sealant.



General Arrangement drawing

## Materials & Tools

Construction requires no special expertise or complex tools, the usual home workshop probably contains anything required. Woodworking tools for formers might preferably include a coping or fret-

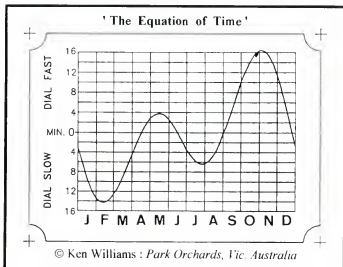


Figure 2

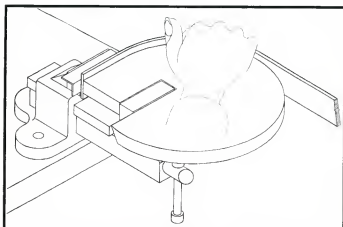


Figure 3

saw, the luxury of a bandsaw is nice but not essential. Bench vice, files, a hacksaw and drill etc. are needed and the only specialised tool required is a pop riveter. Some abrasive sheets of various grades are required and if construction is in aluminium note that painting may be affected by the use of stearate lubricated papers.

The material specified is commercial extruded aluminium bar as it is both easy to work and readily available. Sizes are given on the detail drawings and were stock size at the time of writing. Only one of the required sizes was unavailable and the nearest size bar had to be used, sawn down to the nominated width.

The method of forming the circular arcs on wooden formers is easy, but of necessity the finished radius of the arc depends on the extrusion stress in the bar and to some degree on personal bending technique. The figures on the drawings for finished radii are those encountered when making the prototype. It is possible that there may be some variation. If only slight, the bends can be manually adjusted and in any case the method used for marking out the hour lines automatically compensates for any discrepancy or eccentricity. Care should be taken to see that the inside radius of the saddle matches the outer radius of the hour circle, substantial variation at this point might result in distortion of the hour circle due to uneven pressure from the holding clamps.

Figure 3 shows the method to be used to bend the three arcs. The required form is mounted in the bench vice with the strip clamped between the form and the vice jaw. A separator used between strip and vice jaw will prevent damage.

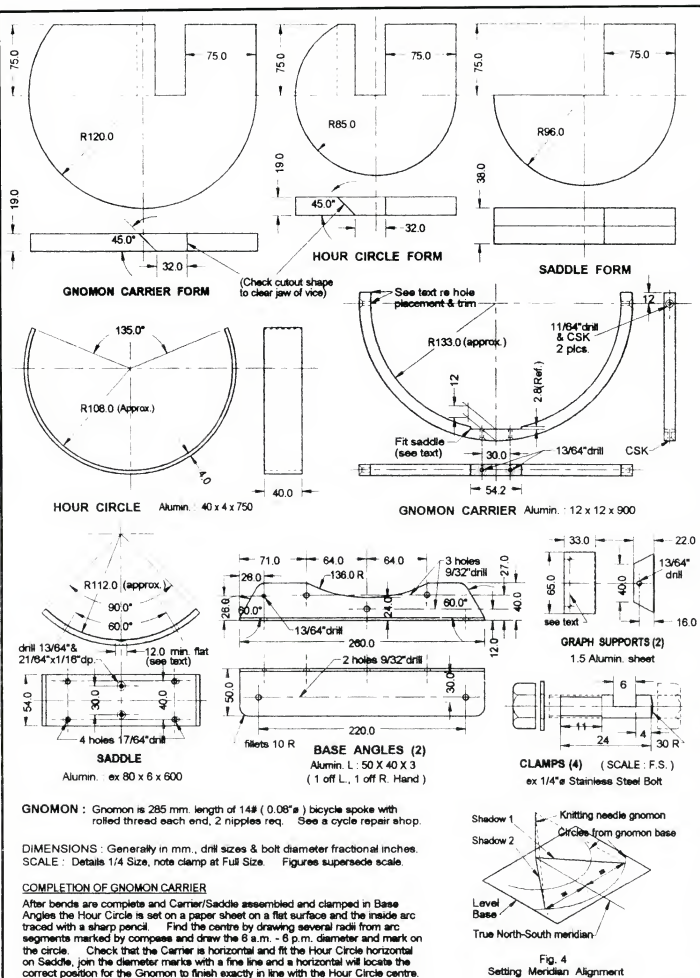
Checking that the strip is exactly in line with the form, bend the strip slowly using both hands to hold the material tightly to the form, the angle of arc here greater than finally needed to allow for spring-back. The gnomon carrier is a difficult bend requiring much pressure, the extra length specified is not an unnecessary extravagance.

## Construction Notes

**Formers:** Plywood or medium density fibreboard is suitable. The latter was used for the prototype and is quite satisfactory for one or two uses. The saddle form needs to be at least double thickness with the layers nailed and glued together.

**Gnomon Carrier:** This bend should be left 20mm longer at each end than finally required allowing final trimming after trial assembly. Exact shape of the Carrier is not critical provided that the final height of the gnomon is exactly at the centre of the Hour Circle. To ensure this the Gnomon mounting holes are only drilled after the correct posi-





tion has been marked out with the centre height obtained from a straight line joining the 6 o'clock lines on the Hour Circle.

**Saddle:** After bending it will be found that this is slightly bowed along the width. Providing the flat surface necessary for mounting the carrier is critical and can be done with a rigid disc sander or by filing. In either case the surface must be flat and even in height on each side. Filing is best done with a 25 cm (10") flat file and the matching surfaces should be scraped carefully to match a clean flat surface.

**Hour Circle:** The form shown allows just sufficient overforming to allow for springback to final size. When the bend is complete check the fit with the saddle. If not satisfactory the hour circle can be carefully modified, clamping successive parts of the arc in the vice and adjusting the ends. See the note 'Completion of Gnomon Carrier' on page ?? for setting out diameter marks.

**Carrier / Saddle:** The carrier must be filed out to exactly accept the saddle with the mating surfaces perfectly flat and square. After filing to a good fit the carrier should be finished with a hand scraper (a three cornered file with two sides ground off and honed to a sharp corner will do). A convenient way to mark the high spots on the filed surface of the carrier is to use a 54 mm. strip of typing carbon paper in the recess and slide the saddle over it using an even pressure. Rivets are 3/16" dia. x 5/8" grip length, countersinks to Carrier holes will ensure a tight grip. Secure the parts accurately square, drill, rivet and finally seal the joint with 'Loctite 601'™.

**Clamps:** Any bolt with 17mm. unthreaded length is suitable. Coat the shaft with chalk and scribe on the opposite centrelines to show correct depth. Start the recess with hacksaw cuts and file to finish. Mount the clamps in the saddle, check if the Hour Circle will slide freely and adjust recess if required. Finally ensure the upper recess corners are sharp by using a fine sawblade as a scraper.

**Base:** Clamping bolts (3) are stainless steel, 1/4" dia. x 1" long, each complete with nut and washer.

**Graph:** Fix supports with 3/16" bolt using 12mm spacer between base angles. Mount the Carrier, fit the Graph central on the supports, mark the hole centres with a sharp point through the Graph and drill 9/64". Fix with 1/8" dia. RH stainless steel screws with nuts and washers using sealant as previously noted.

**Hour Lines:** Use the shape of the Hour Circle marked out as noted on page ?? under 'Completion of Gnomon Carrier' to set out the hour lines. Draw an arc with the compass centred on the Hour Circle centre and set to a radius just inside the traced line. Divide this arc as accurately as possible using the radius length to first subdivide into 60 degree lengths, then 15 degrees for hours and further divisions for the ten minute intervals. Draw radial lines from the centre through the division marks past the setout line and mark off on the Circle itself.

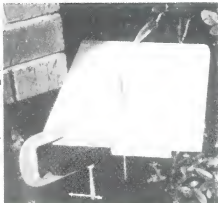
To show the divisions a small hand engraver of the type used to mark tools and household goods is ideal. A straight-edge made from an offcut of the Circle bend and provided with non-slip rubber on the underside will assist. Hour lines are full width, with 20mm for the halves and 10mm for ten minutes. The method of marking calibrations and figures is a matter of individual choice, painting, engraving by oneself or a commercial firm and the use of self adhesive transfers are possible alternatives.

**Finish:** For a smooth even matt finish all components can be evenly rubbed over with 320 grade silicon carbide paper immediately prior to final assembly.

## Setting Up

Correct alignment can be easily determined by using the method illustrated in **Figure 4**. Fix a flat base to the mounting surface and provide a vertical gnomon, e.g. a short length of a No. 11 knitting needle, where shown. Draw two or three circular arcs with a minimum radius of about 6" using the gnomon base as centre. Mark accurately the point in the morning where the end of the gnomon shadow exactly meets one of the arcs and mark also the similar point in the afternoon. Draw the line from midway between these marks to the arc centre to give the true North-South direction. Use multiple arcs in case the second observation is obscured. This method is best used at the time of equinox to avoid inaccuracy due to sun altitude variation between

plots. Secure the dial on the N-S line and proceed to fix the gnomon, which must be set precisely to the angle of the latitude. A large scale map of the area will provide the necessary figure. Later examination of the dial performance can provide a check on accuracy, as at the time of equinox the shadow of a small central gnomon marker will move parallel to the centre of the Hour Circle if the setting be correct. Find the tangent of the latitude angle from a calculator and set out a large triangle on card with a measured base and the vertical dimension equal to the base multiplied by the tangent number. With triangle set on the dial base, line up the gnomon and tighten the base clamping bolts. Finally fix the Hour Circle in position. With clamps loose wait until the gnomon shadow is precisely aligned on the noon line (plus or minus the Equation of Time correction for that day) at the time of the 12 o'clock radio time signal, hold firm and tighten the clamps. (If correction is zero noon line shadow is precisely on the signal).



Setting the meridian as shown in Fig. 4



The completed sundial mounted on an outside wall

## Further Information

For readers interested in the history of sundials and the many different types that have been developed, an excellent book that is readily available from libraries and bookshops is 'Sundials' by Albert E Waugh: Dover Publications Inc., New York, 1973

# Club Roundup



compiled by David Proctor

## Wilson WA

Preparation for the 1998 AALS Convention dominates activity at Castledare these days. Visitors will be able to admire the 1100 trees planted in the Wilson Station area in August. This was achieved at a huge working bee undertaken by several members, with the local MP, members of the Canning River Regional Park Committee and one mountain duck. Planting commenced when the "tree train" arrived with seven wagons of seedling plants at 9.00 am.

The club has decided to refurbish Stanbridge. Work has begun with the manufacture of replacement steel side frames. It also intended to refurbish the foundations, clad the piers and replace girders and cross members. The project will be completed prior to the Convention.

Castledare is now on the Internet at:  
<http://www.iinet.au/~espee/CMR/CMR.html>  
**Castledare Miniature Railway of WA Inc**

**Location:** Rear of 100 Fern Road, Wilson  
**Public Running:** First Sunday

## Nelson NZ

Plans for the new club house have been finished and tenders called for construction to lock-up stage. The intention is that members will complete the interior, including painting, plumbing, kitchen and electrical work. The council has caused a bit of a hitch in proceedings by insisting the building be raised to allow for rising sea levels due to global warming, and requiring a toilet for the disabled be included. This in spite of the fact that there are already toilets for the disabled on site.

The signalling system has been receiving some attention. A new light has been installed at the entrance to the tunnel and the semaphore at the station is now operating, the two signals working in conjunction with each other.

In line with the growing trend among model engineering societies NSM is now on the Internet at:

<http://www.ts.co.nz/~spedding/index.html>

**Nelson Society of Modellers Inc**

**Location:** adjacent to Tahunanui Beach, Walkare St. Tahunanui

**Public Running:** Every Sunday

## Edgeworth NSW

Two new engines were on the track for the August running day. Jack McKenzie had his Blowfly (as yet unnamed) and Frank Thompson his as yet unpainted "Duchess of New Lambton".

The framework is virtually complete on Macgoogies Station, with sheeting and concrete work to be done. Members' pride in this project is reflected in Tom Burns' President's Report to the AGM. "...a new station for the 7 1/4" track rivals the Sydney Opera House for style and complexity and even at this early stage is magnificent. Several enormous concrete pipes are on site to make a tunnel for the 7 1/4" track and excavation to bury them has started. ...Closer liaison with the local council has already borne fruit with the park entrance being graded and gravelled with further work promised before our Convention". (1999.....ed.)

**Lake Macquarie Live Steam Locomotive Society Ltd**

**Location:** off Velinda Street, Edgeworth  
**Public Running:** Last Sunday except December

## Mangere (Auckland) NZ

MLS members are about to manufacture six new 7 1/4" gauge light-weight passenger cars. The front bogie on each car will be mechanically braked and the rear bogie will be braked via a through train vacuum line. The idea is that the cars can be hauled by any size locomotive and still have braking. The wheels are being CNC machined from medium tensile steel and the bodies will be of plywood.

The Queen's Birthday weekend was a washout weather-wise, but there were still around 600 riders. The weather did lift long enough for a night run on Saturday, even though it was rather cold. Since then the weather has been much kinder. The old problem of objects being placed on the track to derail trains has returned, making it important to drive slowly and be alert.

Considerable work has been done on the hill track, particularly in a section where the track had slumped after a tree was removed some years ago. In one place the track had to

be lifted 75mm. Another problem on the hill track is water. After a recent bout of heavy rain the line was found to be under 25mm of water before the first cutting, and in the cutting water was bubbling out of the ground under the track. Water was also pouring out of the tunnel, and when the doors were opened it was found to be cascading through the block walls. The cause of the flooding appears to be a combination of very heavy rain, a blocked council stormwater pipe and a nearly blocked drain coil from the tunnel.

**Manakau Live Steamers Inc**

**Location:** Mangere centre Park, Robertson Road, Mangere

**Public Running:** Every Sunday

## Gisborne Vic

The annual General Meeting in September saw Julie Hartwig take over as secretary for the next two years. A Rally Committee was formed at the meeting and the club is looking at various events over the next few months, including the Alternative Farming Expo at Seymour in February, the Diggers Rest Country Fair in March, a trip to Victoria Barracks and the Ballarat Rally.

The Portable track has been undergoing testing, namely with a locomotive running on it and will be ready for the November market day. On the 610 mm gauge, the Fowler is to be boiler tested and the Perry will follow as it requires much more preparation for the test.

**Gisborne Vintage Machinery Society Inc**

**Location:** Steam Park, Webb Crescent, New Gisborne

**Public Running:** first Sunday

## Durban South Africa

The model Railways & Hobbies Exhibition was well supported by DSME members and on the club's stand were two locos, three large stationery engines running on air as well as two small ones. Also present were models in 00, 0 and gauge 1. Also in the exhibition were railway layouts, r/c planes and helicopters, wooden ships, plastic models, cars stamps dolls houses and much more.

## Club Roundup contributions

AME is pleased to receive club newsletters for consideration in this section. Newsletters are often a good source of articles, which we appreciate all the more, but most of all they help us keep in touch.

It is often difficult to decide what to publish and what to leave out, and the task of selecting material for a wider audience takes a lot of time. Also, there is always the risk that AME will publish something that the club considers sensitive. Please help by sending a "press release" page with your newsletter, or highlight the items you think we could use. We'll give first preference to clubs that help us out this way.

djp

Members are looking at the feasibility of building another petrol driven club loco for use at parties. The flex-traverser is to be commissioned by Christmas and will include a warning siren, signalling and additional fencing. Meantime work continues in preparation for the 85th Anniversary National Steam Meet 1998.

#### **Durban Society of Model Engineers**

**Location:** Kellaway Hall, Hinton Grove, Virginia

**Public Running:** 2nd Sunday

#### **Warner Qld**

Plans to duplicate the ground level track continue and the route from the bridge to the spiral has been set out and back-hoed (along with a signal cable). A grant from the Jupiter's Casino Trust will be used for landscaping and surround to the toilet bloc. There will be a stone wall embankment at the rear, a concrete pad below the wall, and a path to the covered smoko area. A pergola has yet to be attached to the toilet block at the front.

A commercial two door display refrigerator has been installed in the canteen and the kitchen has been revamped to provide more space. The station now has a white picket fence around the passenger area instead of the wire and old rusty metalwork.

The paperwork is all completed and the block of land is now registered solely in the name of QSMEE.

#### **Queensland Society of Model & Experimental Engineers**

**Location:** Lot 5, Warner Road, Warner

**Public Running:** None

#### **Auckland NZ**

The Sailing Committee have made changes to the club's sailing competition rules to enable all members to take part on an equal footing with everyone else in the club and so that everyone has the same chance of winning. In the past, other commitments and various reasons meant that some members were unable to participate during the competition year and thereby trail on the points ladder. The new arrangements also allow free-sailing on competition days.

SMMI members are to assist their sister club (Auckland Society of Model Engineers, with whom they share facilities) by driving ASME's electric loco on Sundays.

#### **Scale Marine Modellers Inc.**

**Location:** Peterson Road Reserve, Waipuna Road, Panmure

#### **Paraparaumu NZ**

Changes and improvements are the order of the day for the PAM members. The existing access track has been demolished and replaced with one much eased in gradient and curvature. A traverser is being built that will run on tyres rather than rails and will be able to be positioned to suit station wagons, trailers

etc. It can be lined up with the steaming bays and also the access track to the main line. The concrete pad for the new steaming bays is down and the existing ones, along with the turntable pit are to be filled in. A set of points will replace the turntable making the existing backshunt into a loop, and another set of points from this loop will provide a backshunt in which to store items not being used. On some club days trains will be able to run in opposite directions using crossing loops and a safe-working system.

At a Special General Meeting in October, members unanimously resolved to change the name of the Society to *Kapiti Miniature Railway and Associates Incorporated*. They now await confirmation from the Registrar of Inc. Societies for it to become official.

#### **Paraparaumu Associated Modellers Inc**

**Location:** Marine Gardens railway, Raumati Beach

**Public Running:** every Saturday & Sunday

#### **Eltham Vic**

The DVR members recently spent a day at the Castlemaine & Maldon Railway, somewhat of a change to their 7 1/4" operation. This railway is a twelve inches to the foot scale tourist railway operating over 7 kilometres of track and based at Maldon railway station.

The 1997 Annual General Meeting saw P.Hibbs elected President. Brian Coleman continues as Secretary.

The Queens Birthday extra running day (Monday) was an ideal opportunity to try something different so trains were turned at Triangle Junction to allow passenger services to run in the reverse direction. The reversal of grades made for interesting driving.

The 3-car electric suburban trainset, the "Doggies" have received a new coat of paint, some bearings plus a few repairs for their 20th birthday. The new platform on No.1 road at Diamond Valley Station has been constructed by contract with points 70 and 71 installed at the arrival end, forming a crossover. The 72nd point, installed at the approach to Nillumbik tunnel, is the first 80 feet (24.4m) radius on the DVR, replacing one at 100 feet (30.5m) radius. The latter has been refurbished and in the new up line near the 'Pimple'.

#### **Diamond Valley Railway**

**Location:** Eltham Lower Park, Main Road, Eltham

**Public running:** every Sunday and Public Holiday

#### **Galston NSW**

The Hornsby District Model Engineers hosted their annual Steam Festival in October. The weather was hot, particularly on the Saturday, which in the high thirties was the hot-



*The small plaque on the side of the viaduct reads "Gils Viaduct....in memory of Gil Silverside 1973 - 1994"*

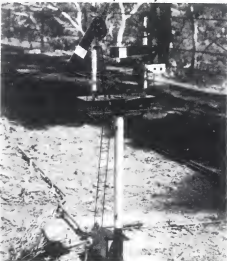
test since last summer. There was a good turn out of locomotives and a wide range of other exhibits including a large number of stationary engines from Don Payne and Russel Paynter, tools, boats and rolling stock. In addition, E & J Winter mounted an extensive trade stand. Two traction engines made good use of the road vehicle track and the now completed Zig Zag style viaduct (above) proved to be a popular spot for photographers.

Work continues on the new replica signal box-style gatekeeper's ticket box and the Arboreal Tunnel is progressing with the greenery now taking hold. The ballast siding and



*The distant signal (above) at the approach to Rabbitt Flat and (below), the home signal it protects.*

photos by D Proctor





culvert from Hill Top to below the car park is near completion and the next task is to construct the chute and bin to enable ballast to be tipped from the car park. Reg Watters has donated two finely scaled semaphore signals,

erected near the proposed Milk Siding at Rabbit Flat.

**Hornshy Model Engineers Co-op Ltd**  
**Location :** 29 Mid Dural Road, Galston  
**Public Running:** 2nd Sunday



## 1998 AALS Convention update - Castledare

### 5 inch Gauge track

The few problems that arose from the 5 inch invitation run day have been fixed. The only one not able to be fixed by the Club was the problem of an 0-4-0 locomotive having the incorrect back to back wheel measurements. This poor little locomotive kept falling through the points.

Please note that the 5 inch gauge track has been built to the AALS broad gauge standard not the fine scale standard. Although the last convention held at the Club showed this does not cause concern to most 5 inch gauge locomotives (from the single wheel Stirling to the detailed Pacifics) we would suggest persons considering bringing their 5 inch gauge locomotives to the convention check these standards to ensure suitability to their locomotive.

### 7 1/4" gauge track

Refinement of this track continues with substantial upgrading of points and cross overs being done. The Club has refrained from doing any major track layout amendments preferring to put resources into the refinement and improvement of the poorer areas of the existing track.

### Rolling Stock

Work is continuing to ensure the upgrade of all bogies is completed by the Convention. It is expected that the fit out of all guards vans with manually operated brakes will be completed by the convention.

### Fire Considerations

As we seem to be heading towards a long hot dry summer with no guarantee that it will break before the Convention a couple of members have commenced work on a second water tanker wagon set for use by the Club during the Convention. If finished in time for the Convention this will enable continuous damping of the track to occur whilst our fire fighting tanker wagon set remains ready to fight any outbreak of fire.

### Bi-directional operation

One afternoon of the Convention has been set aside for bi-directional operation of the 7 1/4 inch gauge track. The big question is will it be chaos or will it be exhilarating. You'll just have to be there to make your judgement.

### The Heidi Convention

On current indications as to what locomotives will be attending the Convention, it may need to be retitled the "Heidi Convention". So if you're thinking of building a Heidi then this Convention will be your best chance to get first hand lots of hints and tips on building one. Such could save you thousands of dollars and many hundreds of hours of work.

### Convention Locomotive Badges

These will only be issued to registered locomotives (complete or incomplete) actually at the Convention. To ensure that these badges attain an intrinsic value there will be no surplus ordered from the supplier over and above the number of locomotives registered. So please don't come expecting to be able to buy a Convention badge for your locomotive at home.

### General

The dollyng up of the grounds continues with a very well patronised painting weekend being held over the 15 and 16 November 1997. Even the wives and younger members got involved. A new larger compressor has been acquired to ensure no one is short of air with which to steam up. The inevitable convention fever is starting to grip the Club's members with the tell tale signs of desperation to finish their private projects and juggle that with ensuring their Club looks spick and span and is ready to tick like clockwork for all visiting fellow five steamers.



## Coming Events

### 21 to 23 February

#### 6th Annual Birthday Run - Edgeworth NSW

Members of the Lake Macquarie Live Steam Locomotive Society invite all to our annual festivities at our track off Velinda Street, Edgeworth. 3 1/2" and 5" g. elevated, 5" and 7 1/4" ground level track.

### 14 to 15 March

#### Invitation Weekend - Hamilton NZ

The members of Hamilton Model Engineers host their annual open weekend at their track in Minogue Park, Hamilton. All invited

### 22 March

#### 50th Birthday Invitation Run - West Ryde NSW

Come and celebrate 50 years of operation with the members of the SLSLS at their Anthony Rd. track site. 2 1/2", 3 1/2" and 5" g. elevated and 5" g. ground level.

### 10 to 13 April

#### AALS Convention

Castledare Miniature Railway, Wilsonton, W.A. Contact Ken on (08) 9375 1223

### 1 to 3 May

#### South African National Steam Meet

Hosted by Durban Society of Model Engineers, Virginia, RSA. (Note date change)

### 2 to 3 May

#### Lake Goldsmith Rally

Rally site located via Beaufort, Vic. More details later

### 9 to 10 May

#### NSW Interclub Run - Orange NSW

5" g. track only (470m.), 240 volt, comp. air, char and petrol available. Some loco storage, some camping (limited). Contact Bob MacKinney (Sec.) on (02) 6362 0456.

### 6 June

#### D-Day, HME at Galston NSW

A D for Diesel day will be held at the Galston Valley Railway, 29 Mid Dural Rd, Galston. Petrol or electric traction also invited. NO STEAM locos please. 3 1/2" and 5" g. only. Call (02) 9484 7583 for details.

### 3 to 6 September

#### Major Centenary Exhibition

Hosted by the Society of Model and Experimental Engineers (UK) 1898-1998, and located at Brunel University, Uxbridge, West London, England. Information from SMEE 100, Resources Exhibitions Ltd, 2 Forge House, Summerslys Road, Princes Risborough, Bucks, HP27 9DT, UK. Phone 01844 34 2894. Fax 01844 34 4988. e-mail: CRE@resourcex.co.uk



# Gooseponds Sail and Scale Model Club

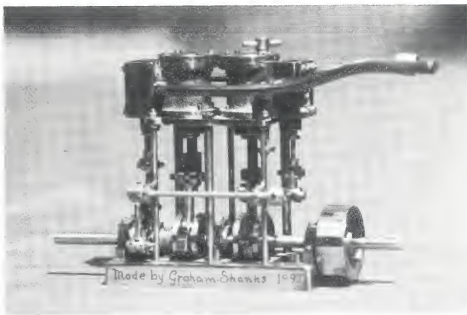
by Graham Shanks

The Gooseponds Sail & Scale Model Club is a small relatively informal group of dedicated marine modellers. As the name implies, members interests are mainly in scale models, both power and sail, although there are a couple of people into Marblehead racing. The club started up about three years ago and now has a core of around thirteen members.

Members get together at the Goose Ponds in Goosepond Creek, North Mackay in Queensland on Saturday afternoons. This varies a bit depending on whether boats are ready or someone wants to try something out. Currently weed is a problem with the ponds being somewhat well vegetated. A good cyclone would clean them out!

Members have built a variety of models, a selection of which can be seen in the accompanying photographs.

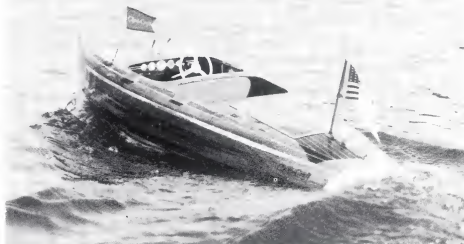
The steam launch *Patricia* and the Barrel Back cruiser were built by Tim Arland of Air-



The engine made from two sets of castings for 'BAT' photo G Shanks



The steam launch *Patricia* serenely chugs across the pond. photo by A Wagborne

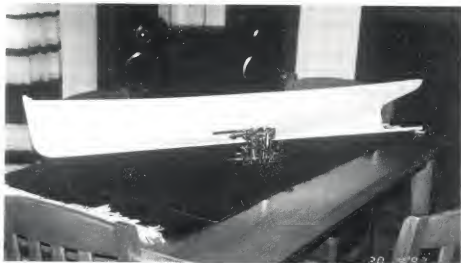


Tim Arland's Barrel Back cruiser in action photo by A Wagborne

lie Beach. *Patricia* is made from a Krick kit and powered by a small twin cylinder steam engine, supplied as an option with the kit, which puts along at a good scale speed. The Barrel Back cruiser is a Dumas kit and has a Mabuchi 540 electric motor and is very nicely finished and snappy in the water.

The Tribal Class Frigate *HMS Ashanti* was built by myself to a scale of 1:64 which makes it 172.7 cm (5ft 8in) long. The deck work is still to be finished. It is made of one millimetre cardboard sides, polyester resin coated, and most of the above deck is  $\frac{1}{16}$  or 1mm plywood. It is powered by an ex photocopier flat motor on 2 to 1 reduction with "O" rings. The motor is very efficient, drawing a very small current and giving high torque. The speed control is to my own design from an LM317 voltage regulator with two relays and a segmented disc mounted on a servo. It works well and the parts only cost about twenty dollars from our local Dick Smith store.

Club president Russell Caesar is building a scale steam launch *BAT*. The plan of the steam launch was scaled up to 138.5cm (54 1/2 inches) and the model planked with white beech. Long hours in the cane crushing season has slowed progress down at the time of writing, but I don't mind as I am making the steam engine and there are still many pieces to make. The engine is from two sets of No 5 Open Launch Engine castings from E & J Winter, set back to back with a slip eccentric reverse mechanism and a valve set-up found in a 1920 book, *Machinery for Model Steamers*. It used only one eccentric for the two valves, tricky to set up, but it works.



*The hull of the BAT lies across the dining table with the steam engine in front of it  
photo by G Shanks*



*The author's Tribal Class frigate HMS Ashanti makes an impressive sight in the water. Hard to  
see where the deck work is not completed*

photo by A Wagborne

## Australian Model Engineering Back Issues

The following are available:

#14	November	1988	\$4.00
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#27	December	1989	\$4.00
#28	January	1990	\$4.00
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**1998 Entry Form**

Name ..... Age .....

Address .....

..... Phone .....

Club or Society (if applicable) .....

Qualifications and/or occupation .....

Brief description of entry .....

Approx. dimensions & weight ..... (Enclose photo if possible)

Equipment used in construction (e.g. lathe, drill press, hand tools etc.) .....

Other information relating to the entry (eg. outline of construction and assistance had, if any)

Australian Model Engineering undertakes that the privacy of entrants will be respected.

I hereby declare that:

1. I have personally constructed at least 75% of my entry.
2. I was under 25 years of age as at 31st December 1997.
3. I agree to the conditions of entry and that the judges decision will be final.
4. I agree to display the entry at the 1998 AALS convention site for the purposes of judging.

Signature ..... Date .....



## The AME Under 25s Encouragement Award

### Conditions of Entry

Younger model engineers are making great contribution to the hobby, even though they are often hampered by having less access to tools and resources than older model engineers. AME instigated this award in 1993 to encourage under 25s to show their talents; to engender a spirit of encouragement in more experienced model engineers; and in a small way to foster the growth of participation by people in the younger age range.

We've been pleased to hear that a number of under-25s have been spurred on to complete their models by the thought of participating in the award.

If you fit the age criteria, photocopy the entry form on the next page, post or fax it to AME and start a-fittin' and a-turnin'!

### Age criteria

If you turn 25 in the 1997 calendar year or later, you are eligible. If you turned 25 in the 1996 calendar year or earlier you are not eligible.

### Entries

May be any model or experimental engineering item or model. For example it can be

a steam, diesel or electric outline locomotive; steam, internal combustion, electric, hot air and Stirling cycle, stationary or mobile plant or road vehicles; boats or ships with any form of power drive; marine plant; workshop equipment, jigs, fixtures and aids to manufacture; clocks and other horological or astronomical items; electronic, programmable logic, digital and analogue controls and monitoring of any of the above models — or any other item(s) which the judges consider relevant to model engineering.

### Judging

The following is taken into consideration:

- The age of the entrant and skills relevant to age.
- The ambitiousness of the project.
- The workmanship of the project.
- The access to workshop facilities.
- The location to resources and materials.
- The formal skills of the entrant.

The above is intended to even out the playing field so that the judges may look at

each entry "all things considered." The idea is that the thirteen year old student (with no formal mechanical skills) from the Back'O'Bourke who works in a tin shed with pistol drill, hacksaw, file and hand scraper to build a model of a ferris wheel has as much chance as the 25-year-old qualified thou-splitting toolmaker with a CNC workshop and limitless resources who has turned out a VR H class 4-8-4 with working stoker engine!

### Have a go!

The presentation will take place at the AALS convention at Perth this coming Easter. Entries will be received up to day one of the convention. The perpetual trophy will be awarded at the AALS presentation night on Sunday evening. A prize (to keep) relevant to the winner's interest in the hobby will also be presented.

So come on all you younger model engineers, let's see the tables with plenty of entries on them in Perth this Easter!

## Showground Steam Railways

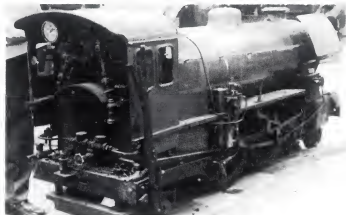
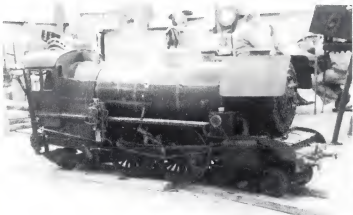
Story and photos by John Snowden

As a very young boy my introduction to steam railway was at country agricultural shows — Tenterfield, Casino and Lismore NSW — where the main attraction was a steam locomotive pulling a number of carriages around a 12" gauge track to the delight of dozens of young passengers. I refer to the late 1920s and '30s. To pacify my interest my father told me he would buy me one "some

day"! I still don't have that steam locomotive but I am working on a traction engine.

While at Scoresby in November 1990 I saw the locomotive, shown in the photos, in the workshops of the Melbourne Steam Traction Engine Club. This is the first one of this size that I have seen since before World War II. Further searching revealed many carriages nearby to seat two-abreast facing the engine.

Out in the yard I saw a large stack of 12" gauge track just like an enlarged edition of Hornby track. I understand that this railway is being restored to its former glory. Perhaps a kindly reader could provide an update on the restoration project and/or the history of this equipment.



# A Great Eastern Tram

## Part 3 of a construction series of a 5" gauge battery-electric powered tramway locomotive

by John Campbell

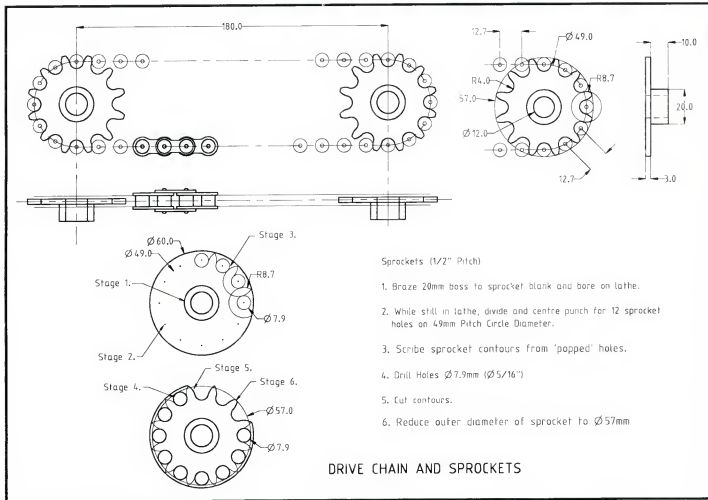
*Photos by the author unless otherwise noted, drawings for publication by Peter Manning*

In this issue we show you more detail on the chain drive system and the motor mounting details. Then we will make up the floor and cabin body.

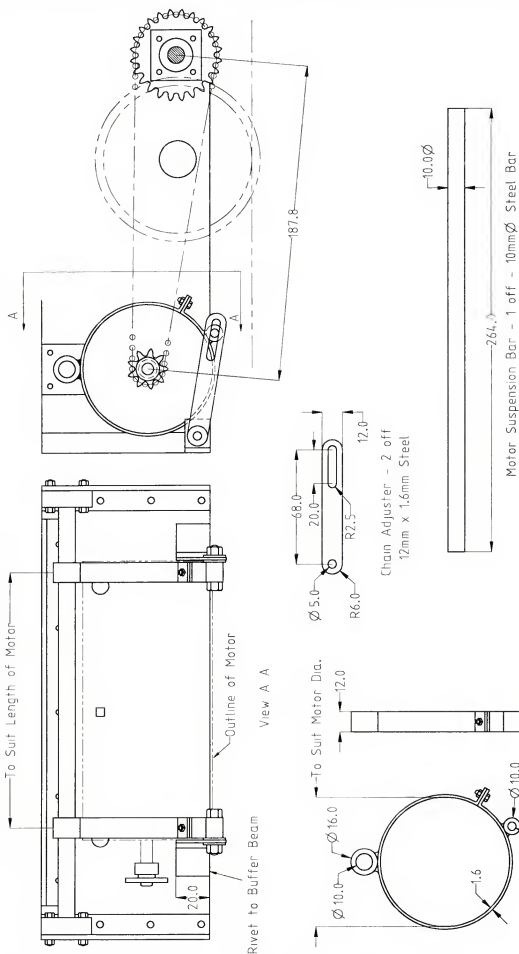
There seems to be a fair amount of interest in this project so far. How about dropping AME a line if you have one underway. Maybe we can show our readers some progressive details.

### Floor

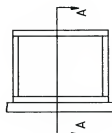
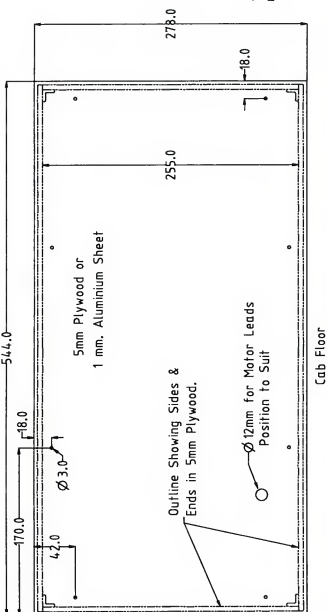
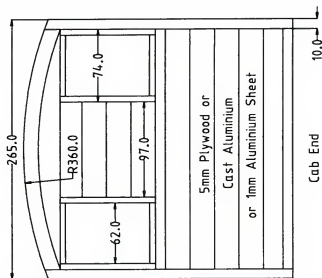
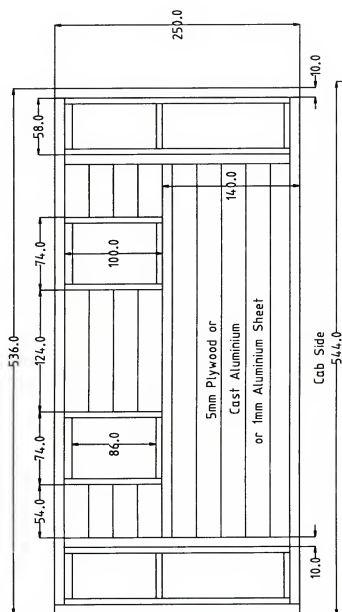
It is easy to give measurements but in this case it is more important that the floor overlap about 2mm outside the sides and ends of the frames and cabin. The floor may be plywood or sheet metal, aluminium about 1.6mm being suitable. Again look around the scrap man's stock for something suitable. The floor will be held by the same screws as hold the body to the chassis and can be drilled now and mounted temporarily in place.



Location of Straps and Adjustment Angle Supports  
To Suit Length of Motor



## PRIMARY CHAIN DRIVE, MOTOR SUSPENSION AND ADJUSTMENT



12 x 12 x 3mm Angle

View AA

WINDOW - Typical Section

Trim of 7mm x 3mm and 10mm x 3mm cast on, or rivetted to metal cabin, or glued to wooden cabin.

CABIN DETAILS



## Cabin

I originally built three of these little locos and thought it worthwhile to make patterns for the side and ends. These were cast in aluminium and although there was a fair amount of cleaning up the result was quite good. The patterns are available for use if requested. If you go ahead with castings they need filing around the edges and some scraping of any rough spots. The sides and ends are assembled with 3mm by 12mm angle, brass or aluminium being preferred. The corners may be bolted together with 3mm screws or as on my latest loco may be glued together with Araldite®. The angles will need some clearances cut around the windows. The angles for attachment to the chassis are 12mm by 20mm and are fixed to the body in the same way.

I made one body of aluminium sheet, riveting on the detail of 7mm and 10mm by 3mm aluminium strip using short lengths of copper wire from the scrap man for rivets. This was rather tedious but has made quite a nice job.

A body made from 5mm plywood would probably be the simplest, again with detail of similar sized wood strips pinned and glued in place. Although the pictures that I have seen usually show the side doors open I have built them in the closed position to give added strength. When I was making the patterns and again when making the aluminium sides I grooved them with a round ended dental burr

using a flexible drive and a steel strip (not a good ruler) as a guide clamped to the sheet.

My loco is brush painted with Dulux® enamel, Mud Brick outside and Wafer (light yellow) inside.

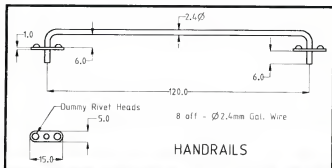
## Handrails

The material for these is easily obtained as they are made from wire coat hangers from the dry cleaner. These vary in thickness so some selection is necessary. I measure my latest stock at 2.4mm diameter but the actual size is not important. A bending jig was made of a piece of aluminium bar about 12mm square and 120mm long with one corner of each end rounded off at about 2mm radius. Lengths of wire were cut and bent at right angles. A second jig consists of a piece of thin plate drilled to match the centres of the rails and will be used to drill the sides for attaching the handrails. To add to the effect you may like to go a little further and add dummy mounting plates and rivets to the handrails. Small pieces of brass about 15mm by 5mm with dummy rivets are soldered or brazed to the handrails. Another small jig enables you to punch the dummy rivet heads in the plates before trimming them to size.

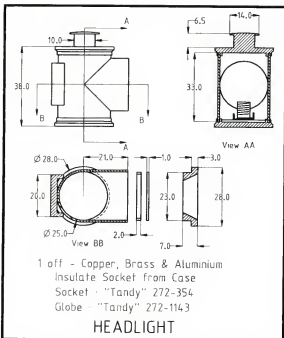
The hand rails are painted black and attached with Araldite after the body has been painted.

## Door handles

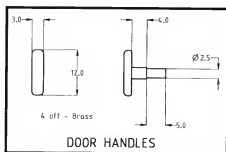
These little handles will add a bit more interest for the children who like the tram so



HANDRAILS



HEADLIGHT



DOOR HANDLES

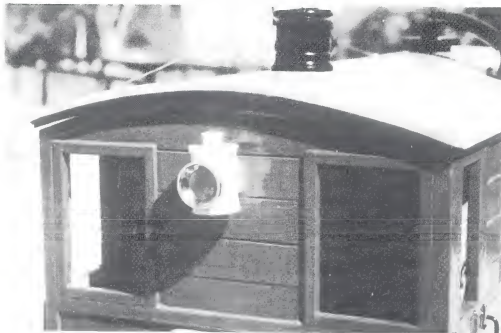
much. They are turned from 12mm brass rod, sawn to width, and filed to shape and polished. They are glued firmly into the doors so that little fingers will not be able to pull them off.

## Headlight

The headlight is made to work although the ones which I made do not have reflectors and do not light up the track. You are sure to

be asked whether the light works and the effort of arranging this is not great. The lamp body is made from two pieces of 25mm copper tube brazed together. A small piece of channel brass is milled and brazed to the back of the body at the same time. The base and top are turned from brass or aluminium and the front with its bezel is turned from brass and polished. A thin layer of Araldite is allowed to set in the base before gluing the socket for the globe in place. The leads are led out through the centre of the back and will pass through the front of the cabin. The headlight is assembled by gluing on the base and gluing the glass, backing ring and bezel in place. The top is left removable for changing globes. A special tool will be required for this. The headlight is painted white inside and outside and is attached with two 3mm screws.

To be continued...



# 85 Years in Durban

*Background information and photos courtesy Nalder 'Steve' Stephens*

*Although located in the Republic of South Africa, the Durban Society of Model Engineers is a club which features regularly in our Club Roundup pages. 1998 is the year in which they celebrate their 85th Anniversary, an appropriate opportunity to look at the club and its history.*

The Durban Society of Model Engineers (DSME), founded on 2 July 1913, is the second oldest model engineering society in South Africa. Capetown SME is the oldest, dating from 1907. Minutes of club meetings prior to 1929 are no longer in the club's possession, but anecdotal evidence is that the club wilted somewhat during the First World War, in common with other clubs then in existence around the world. By 1929 the then "DSME and Craftsman" was fairly strong and

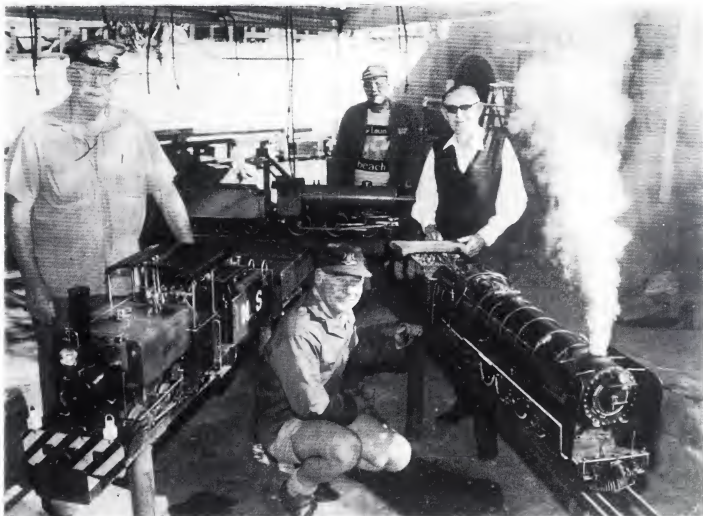
in May of that year a new constitution was adopted, with an attendance of twelve.

The first Annual General Meeting was held in September 1929 in the basement of City Hall. The following year meetings were transferred to the Commercial Garage and then to a room in the Technical College. During the Second World War, meetings dwindled but were resumed in 1944 at H.Kellaway's residence. At this time membership was 48 (30 senior and 18 junior members). Meetings again returned to the Technical College and the Society built a portable track of brass rail, 120 feet (36.5 m). This enabled the club to set up for train rides at many public functions such as school fetes.

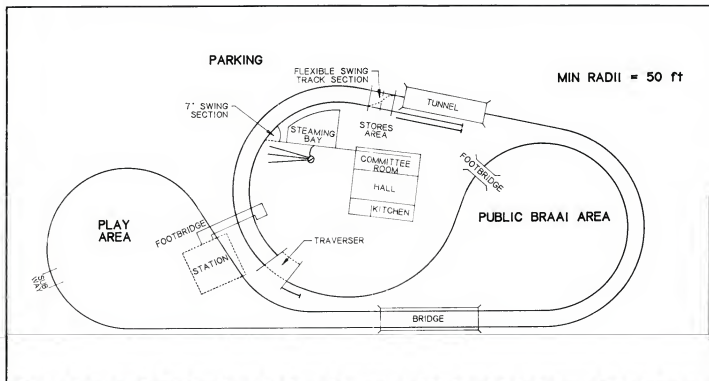
The members of DSME had long felt it essential that the club have a site where a club house and permanent track could be built. On 18 December 1959, after 13 years of search-

ing and negotiating with the City Council, chiefly by Basil Palmer, a site was granted on the banks of the Umgeni River just below the Athlone Bridge. The members set to and in a remarkably short time a simple brick clubhouse was built, together with a raised 3½" / 5" gauge track about 220 yards (201 m) long. This was opened on 6 August 1961 by the Administrator of Natal, Mr A E Trollip.

The members' happiness was to be short-lived. After only six years, the Council decided to build a new Athlone Bridge to cater for the increasing road traffic and they found they needed the land occupied by the DSME. The search was on again, and after much negotiating the present site in Hinton Grove, Virginia was accepted on 6 July 1966. After a lengthy battle with the Council for compensation, a sum was awarded to cover the cost of a new clubhouse.



*DSME members (from left) 'Steve' Stephens with "Wasp" (formerly a Sweet Pea), Peter Crookes with SAR 15F, 'Tex' Lishman with another member's "Springbok" and Jack Gregory, builder of the 15F. (hope I have the names right...Ed)*

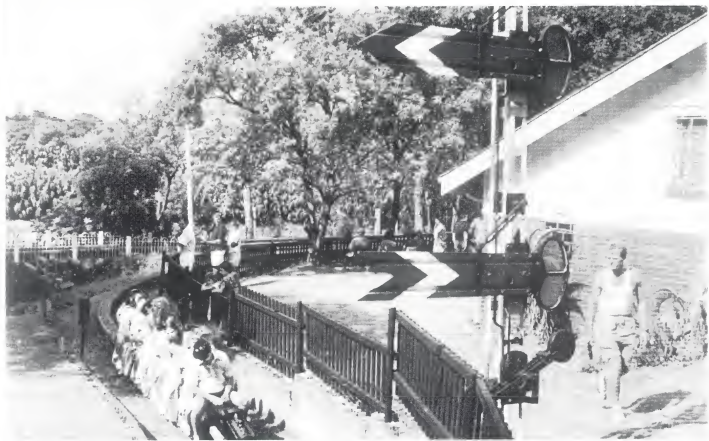


The new site was actually a vleai (marsh) overgrown with reeds. These had to be cleared and much levelling done before anything could be built. A contract was let for the building of the clubhouse which was started in August and completed in November 1967. Before the track could be built, brick piers had to be sunk to a firm base as much of the land was fill. Concrete track supports were placed

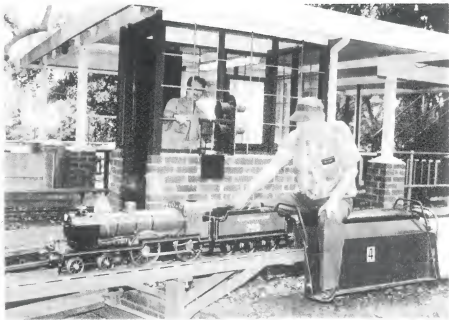
on top of these. A large donga (gully) had to be bridged requiring wooden piles to be driven, firstly by hand and later using a purpose built electric winch. The concrete track beams were then fixed, followed by wooden sleepers to which the rail was screwed. (The DSME track is an elevated one). The rail was aluminium and was bent to 50 foot (15.2 m) radius curves on a bending machine again

built for the purpose. Rail laying was completed on 8 November 1969.

The station was built and named Virginia Halt. It incorporated a signal cabin and a small moveable traverser used to transfer rolling stock from the steaming bay onto the main line via a service track and turntable. The



*The view from the driveway showing part of the club grounds and the clubhouse on the right*



Peter Wright driving his LBSC 5" gauge "Maid of Kent" with signal box and station building in the background

whole complex was officially opened on 16 November 1969 to considerable applause.

Once the clubhouse and track were fully operational membership rose to 80, regular running days instituted, and in the afternoons the public were given free rides. The donation box, even though in a prominent place, got little attention. Some birthday and Christmas parties were run but the volunteers were few

in number. Trees were planted in the grounds and a much needed club loco "Netta" was completed in 1970.

Since 1980 many improvements have been made. The clubhouse was lined and concrete floors covered. Crowd control barriers have been built and in order to raise much needed funds a decision was made to charge the public for rides. The birthday party market was

tapped, facilitated by the construction of a petrol engined loco. At the same time an air operated traverser was made which allowed the whole train to be shunted on or off the main line in one go rather than one item at a time. The steaming bay was roofed over and water and air supplies laid on. Anti-tipping rails were installed on the track and two new bridges built. A second petrol engine was subsequently built to take some of the birthday load off the original engine. Public exhibitions were begun in 1981 and held every three or four years since, and DSME hosted National Steam Meets in 1982 and 1986.

This year, as part of the 85th Anniversary celebrations, DSME are to host the National Steam Meet on 1 to 3 May. Preparations have been long under way and have included the provision of a two metre long hydraulic rise and fall turntable (800 mm) to facilitate unloading from the back of vehicles. The fifteen metres of matching steaming bays have standardised air and water couplings. A flexible traverser has been installed to provide a loop line (by-pass) from the main traverser by the station to the tunnel. Rewiring the signal system, shower and changing room and complete fencing are also part of the preparations.

The Durban Society of Model Engineers are located at Kellaway Hall, Hinton Grove, Virginia 4051. KwaZulu-Natal. Visitors are always welcome.

## Product Reviews



### STEAM LOCOMOTIVE No 299 Our Living Heritage

In 1897, Walkers Limited of Maryborough in Queensland made their debut as a builder of steam locomotives when they supplied a B-15 class 4-6-0 locomotive to the Queensland Government Railways. This locomotive, which carries Walkers Limited works No. 1 was allocated the number 299 by QGR when it entered service in January 1897. One hundred years later 299 resides at the Maryborough railway station where it has been restored to running order and is cared for by the members of the Model Engineers & Live Steamers Association (MELSA).

The centenary of 299 in January 1997 coincided with the city of Maryborough's sesquicentennial celebrations and the members of MELSA chose to mark the event with a commemorative publication. This well produced book chronicles the story of an historic locomotive from the placement of the original contract for construction, through its long and chequered career, subsequent withdrawal and eventual restoration.

The book has a soft cover, glossy with colour photographs front and rear. Inside, the 48 pages are on high quality gloss paper, well illustrated with monochrome photo-

graphs throughout, copies of works G.A. drawings, and a text full of facts and anecdotes. The relatively small number of photographs of 299 in revenue service is the only down side, but given the fact that it was withdrawn back in 1966 after spending its working life in remote northern Queensland, probably few photographs would have been taken. On the plus side, this is more than compensated for by the wide range of quality photos which do appear and complement the well written text.

This book is a great read and would be a valuable addition to the library of the aficionado of QR steam, the enthusiast of railway history and anyone interested in our industrial heritage generally. Proceeds from the sale of the book go to the continued upkeep of No. 299.

#### Steam Locomotive No. 299

##### Our Living Heritage

##### Available from:

MELSA, PO Box 355, Maryborough, Qld. 4650.

Phone (07) 4122 3119

Price: \$12 (plus \$3 post & handling)

David Proctor



# Springtime Gatherings

story and photos by David Proctor

*Inter-club rallies seem to reach their peak in the springtime. Here we take a brief look at two of them.*

## Trains and Tulips

Canberra Society of Model and Experimental Engineers hosted their annual Invitation Run on 27 and 28 September. As is usual this event coincided with Canberra's annual festival of flowers, Floriade...."trains and tulips in spring" being the local description.

The weekend got off to an early start with some people arriving on Friday afternoon and unloading. Saturday however, was the main day for visitors with the grounds not being open to the public. The weather gods were kind and after a little early morning fog a more perfect day would be hard to imagine.

## The passing parade.....



*Les Boyd from Berry Railway drives his petrol powered Alco*



*.....followed by Alan Wheaton from Wagga Wagga driving a Simplex*



*.....who is in turn followed by Syd Cleland from Diamond Valley*



*After the official opening of the Kingston station, the Minister drives the official train headed by Ian Smith's Bunyip"*

Locomotives began appearing on the track by 8 am.

The highlight of the morning was the official opening of the new station building by the ACT Minister for Tourism, Mr Trevor Kaine. Proceedings started with a few words from club president, John Nicolson, who then called on Doug Mellor (1996 President) and Neil Matheson (current President) of the Bankstown Steam Locomotive Society and presented them with a cheque for \$250 from CSMEE towards the costs of making repairs after the serious bouts of vandalism that club suffered last year. Incidentally, Doug Mellor is the son of the founding president of CSMEE, and he had his 3½" NSW C36 loco in steam. During the day. Next up was AALS President Barry Glover with a few words, and then the Minister. The station building is an old bicycle shed of 1943 vintage from the Kingston bus depot, which has been beautifully restored by members. They also have a second one on site awaiting restoration.

The CSMEE track is conveniently located in the same grounds as the ARHS (ACT Division) railway museum and tour operating base. A steady stream of visitors was seen wandering through the museum observing the large number of items stored there. The ARHS make sleeping cars available for accommodation over the

weekend and these were well patronised.

Sunday was another great day with locos again on the track early, but not all. Some were a little slow off the mark after the "well lubricated" spit roast the previous evening. (although some chose to do a bit of night running instead). As Sunday is the public running day a steady stream of passengers queued up all day long. About lunch time the slow process of packing up began with people heading for home throughout the afternoon.

## Wagga Wagga

The weekend did not look too promising for the Wagga Wagga SME run at the beginning of November with dark skies and rain showers on Saturday morning. As it turned out there was no cause for alarm as the locals had it well organised and the rain went away.

The society's Willans Hill Railway is located in the city's Botanical Gardens on the



*Saturday morning's rain in Wagga Wagga did not dampen the enthusiasm in the steaming bays*

side of a hill and makes a fabulous location for a railway. On leaving the station you have a choice of two routes, both up hill. One of them takes you up around a long sweeping curve, under a bridge and back to a route parallel with the station but at a higher level, where it is rejoined by the longer route. The longer route makes a steeper climb from the station, up over previously mentioned bridge, onto a section of single track working, under a street and up to the top of the hill, around the Museum Loop and down again. After joining with the lower, route the track continues through a curved tunnel and long cutting, then past the steaming bays and back to the station. Extensive earthworks are already under way to extend the track and incorporate a large spiral on the hillside, 450m long and containing 3000 cubic metres of fill.

In spite of the showers, the steaming bays were full of locos very early on Saturday, mostly 7¼" gauge though there were a few 5" ones present. No time was wasted in getting them onto the track. Meanwhile up in the clubhouse, on display was a model yacht and an immaculate RAF Pinnacle built by Alan

Fern, as well as a table loaded with items for sale (from an estate?). Les Mouat had his AME Retail stand set up and was doing a fairly brisk trade by all accounts. During the morning the weekend was officially opened by the Mayor of Wagga Wagga and the local state

MP. Alan Fern was giving demonstration runs of his beautiful Cirrus aero engine (which will be featured in a future issue of AME), and the extensive road vehicle track was being put to good use by the traction engines. As the day wore on the weather began to cool and by Saturday night it was rather cold for the barbecue. This did not stop a few hardy souls driving on into the night.



*John Wood's beautifully built battery-electric NSW SRA 73 class*

Sunday dawned sunny and warm...perfect. The public also turned out in large numbers which guaranteed drivers would have full loads for the substantial grades they would encounter. Miss Wagga Wagga and her entourage turned out for a ride, and in fact it is evident that in the local community, the Wilans Hill Railway is definitely regarded as one of the more popular local attractions. In fact at the opening ceremony on Saturday it was pointed out that the railway is regarded as a great asset in the town and it is tied in with a lot of community events. The council is fully behind the club and as well as assistance have encouraged them to expand and grow as much as possible.

The crowd numbers remained constant throughout the day, but around lunch time people who had travelled from afar were beginning to prepare for the trip home. As they departed no doubt more than one was thinking of the visit next year with the hope of trying out the new spiral.



*The scene where the longer route rejoins the lower one, which comes in from the left*



*Melanie Dennis arrives at the Museum Loop with Gerardus Mol's QR C17 class loco.*



*Front view of Alan Fern's RAF Pinnacle*

# A Wealth of *Wombats*

by Bob Brown

Back in 1985 I designed and built a small freelance locomotive *Wombat* as a replacement for my aging vertical boiler loco *Curly* (my memorial to the great man of model engineering, L.B.S.C.) and to operate on my 7¼" portable track. This equipment is used for fundraising by the West Australia Model Engineering club, yours truly being the President for the past 15 years.

Over the past three years I have built two more *Wombats*, numbered 4 and 5. These are to the same basic design but with different styles and valve gear. Built to the teachings of L.B.S.C. — simple and straight-forward — they both turned out to be star performers. Main dimensions are 2" x 3" cylinders and 6" wheels with 7" barrel copper boilers to AMBSC specification of course.

A while ago I was persuaded to drop down a gauge and do a 5" version for a friend. In fact I built two! I am semi-retired now (which means no spare time!) and have a workshop that features a Taiwanese 6" lathe mill drill.

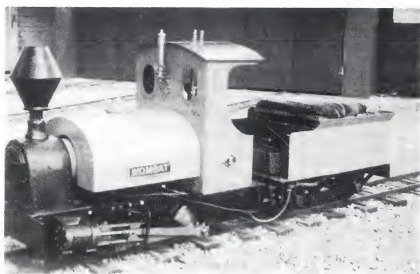
My current project, believe it or not, is a 7¼" *Wombat*! This engine was started by a good friend who is unable to see the project through. It is my intention to complete the engine but with Walshaerts gear and a tidy up of the design. This in my experience will produce the best *Wombat* of all, a simple engine with no fine detail and, as 7¼" locos go, not too big.



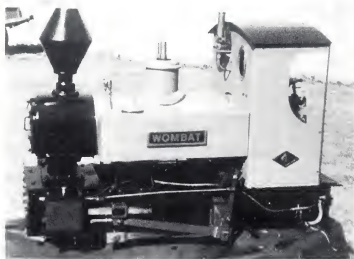
*Bob with Curly, the geriatric steam skateboard*



*Wombat doing some fundraising*



*Inside valve saddle tank Wombat, bearing the number 5*



*Wombat numbered 4*



*5" gauge Wombat numbered as 6*

# Earth Leakage Detection for Model Engineers

by Peter Dawes

Earth leakage detection (ELD) is a system fitted to mains power lines in houses and factories to protect personnel from accidental electrocution. The ELD device is basically a circuit breaker (CB) whose contacts carry the power to all devices connected downstream. When the CB is tripped those devices are shut down within a second. They cannot be restarted until the user resets the CB.

You might be asking: "How can the ELD device know that someone is being electrocuted 100 metres away?" Good question! In a single phase line "neutral" is at earth potential, and "active" is at 240Vac. Think of the active lead as the "outgoing" lead and the neutral lead as the "return". It's obvious that if appliances are drawing current somewhere down the line, exactly the same current flows in both active and neutral. On the other hand, when someone is being electrocuted by touching a live part of a machine, he is drawing current from the active line, but that current is NOT going back through neutral. It's going to earth through his boots, hands or whatever.

So these ingenious devices work by the simple expedient of continuously monitoring the difference between the currents in the active and neutral leads. If that difference reaches the trip level the CB "drops out". The hard part, and the reason why they are expensive, is reliably detecting a difference that is only 0.3% of the amplitude of the currents.

There are two types of earth leakage circuit breaker (ELCB). One is where the device is a specific purpose unit used locally on a particular power lead. It may be a built-in outlet on the wall or it may be a portable outlet. The second type I installed centrally. It is located in the central fuse box and might control all or most of the power to the building. The central device is cheaper if there are a number of outlets to be protected.

ELD is now a legal requirement in all new domestic constructions, and also in commercial buildings where building is actually under way, although it may be removed when the construction is finished. (This is because builders will be using portable power tools.) If a new garage is being built and wired up, ELD is legally required because a garage is regarded as a place where portable tools are used. On completing the wiring job the electrician notifies the local electricity distributing authority which is required to inspect the wiring to ensure it conforms to SAA rules. But don't assume they do! I've had circuits wired to the wrong flat, space heaters not connected to the space heating circuit, and other things that have cost me a lot of money. An inspector

will see there's an ELCB and that's it. It could be wired to the moon that that's not his job!

ELD is an important safety feature when using portable power tools and for appliances where the mains are semi-exposed such as in electric radiators, jugs and especially in toasters and electric steam irons. But it can also be a disaster if there is a deep freeze and refrigerator on the same line. The householder might be away and something totally unrelated to the freezer might trigger the ELCB. It shuts off the mains and the freezer begins to defrost. So when the house is wired up separate lines should be installed to points where food is to be stored. ELCBs are installed for general purpose power outlets but not for lights or spas. It's presumed that you don't use a portable tool in a spa. No, I'm not joking! The electrician will put a non-ELCB circuit in the kitchen and perhaps one in the laundry labelled "fridge/freezer only". So now there are two distinct power circuits throughout the building. The moral here is: never make the mistake of connecting your freezer to an ELCB circuit, even temporarily, because you might forget all about it.

My house was built before ELD was even thought of so rather than install a big central unit and rewire the house, I have replaced certain power outlets with local ELD outlets where potentially dangerous appliances are regularly used. Elsewhere I use a portable device. In my house it so happens that the same outlet is used for the toaster and the iron, and right next to it on the same circuit is a freezer. I've replaced the old toaster outlet with a flush-mounted HPM "Electsafe" dual outlet, type 777EL30, with a tripping current of 30mA. It has tripped "spontaneously" only twice in a number of years. This model currently costs about \$80. Type 777EL10xx trips at 10mA for more risky environments. A plug-in adaptor ELCB is available from Dick Smith stores at a lower cost. I've had no experience of it whereas the HPM is a proven device that has been around for a long time.

Now 30mA is enough to kill a person if it passes through his heart, so why is the leakage set so high? The problem is that the lower the setting the more false triggering occurs. That can be so frustrating that it may tempt a householder to disable the ELD. So it's a tradeoff. ELD has two other crucial advantages, however. Firstly it cuts the power very quickly. A person can usually be saved when resuscitated immediately, but if shocked for many minutes he may be beyond rescue. The second point is that by cutting off the power instantly, rescuers aren't themselves electrocuted when they go to his aid.

So ELD is a good thing - make no mistake. You just need to know where and how to use it. Because garage and workshop circuits would normally be on ELCBs we may have a problem using variable frequency controllers (VFCs) on our lathe, drill and mill. This is because they can have a small leakage to earth. Now this is not because they are "unsafe" devices. Basically, the problem lies with the filters on their input leads to keep electromagnetic interference (EMI) from escaping into the mains. These filters are generally inductance/capacitance (LC) low-pass, high frequency stop-filters which by their very nature bleed a small current to earth. The leakage comes from the small high voltage AC capacitors connected from active and neutral to earth, one at each end of an inductor giving rise to its name "Pi" filter. The current that flows is only of the order of milliamps but is constant and continuous. Unfortunately it can be enough to trigger sensitive ELD devices and cause a power shutdown.

There would seem to be three ways of dealing with the problem. The first is to use a separate "feed" line for the VFC. VFCs have built-in phase-to-phase and phase-to-earth protection of a high order, and because they are only used on static machines, ELD is unnecessary anyway. (Although if the VFC's own protection should happen to fail, ELD will help minimise the damage to both VFC and motor before the mains fuse blows.) The second way is not to use capacitive (LC) filtering in the VFC at all but use straight-through choke filters or "reactors" (in other words plain "L"). Reactors cause a small drop in the supply voltage but don't pass current to earth. The filtering may not be quite as effective, but may be adequate in non-critical locations. A theoretical third way is to set the trip point so it is above the filter leakage range. That protects the equipment but compromises the protection for humans. It may well be illegal too. In any case adjustment is not provided on domestic units because they are designed to save lives not fit in with VFCs.

**FilterKits** Those who want to make their own pi filter (LC) can look up the article in *Electronics Australia*, Vol. 58 no.7, June 1996 p.82. This is an updated version of an earlier model which claims to overcome problems of triggering ELCBs by using smaller capacitors. If using this particular circuit in the workshop with loads of more than 5A I would suggest using a heavier wire, such as 1.6mm or 16SWG. Just wind as many turns of the thicker wire on the ferrite rods as will fit. The filter is available in kit form complete.

*Continued on page 46*



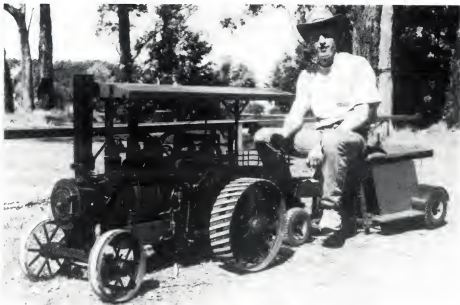
# Berry Invitation Run

Story and photos by John Nicolson

This year the Berry Railway Incorporated staged its Invitation Run and traction engine rally in spring for the first time. The President and genial host, Les Boyd, together with Noel Bruce, co-owner of the track had been working hard with the assistance of local members to have the property in tip top condition for the event. Although only one week after the Maitland traction engine rally a significant number of these machines were present, the biggest being Peter Smith's 4½" scale Allchin from Newcastle.

Visitors began arriving on the Friday evening and included Stan McKeown and Helen Hitchins from Geelong and Graeme and Kaye Clarke from Gippsland with their Bunyip *Kaye-C*, complete with two passenger cars. John and Jenny Nicolson from Canberra supplemented this with Ian Smith's *Bunyip*. By 10 pm these early arrivals had set up their camp sites near the 'Barracks', a converted dairy that seems to improve year by year. The event was well organised. On arrival visitors were asked to sign the attendance book and were given a name badge and a map of the extensive 7¼" gauge railway and the traction engine trails. Drivers running on the track for the first time were given an introductory tour of the track under the supervision of a driver familiar with the road.

Dawn on Saturday revealed Graeme Clarke steaming up his engine for the first run of the day, even before breakfast. As the sun rose, the full beauty of the site revealed itself. The wattle (Illawarra Hickory) which had germinated several years ago after the earthworks for the track extensions were now reaching their most attractive state. Thickets of young trees in full bloom lined the track, forming shady glades through which to run. Welcome they were as the day wore on and tempera-



Tom Reinhold gives his *Cliff & Bunting* a run

tures climbed to the low thirties for the first time this season.

*Kaye-C* was soon joined on the track by Trevor Laurence driving the local *Bridget* and by *Bunyip*. Greg Laurence was busy marshalling scale cars and ride-in gondolas for the day's work. Next engine on the track was Bill Henderson's home based *Black Five* (to Martin Evan's "Highlander" design). Pleasant running ensued with visitors being invited to ride the trains after first signing the book. The Berry Railway is a challenging track to drive, being almost two kilometres long, with sustained one in forty grades, so good brakes and careful handling of the throttle are essential.

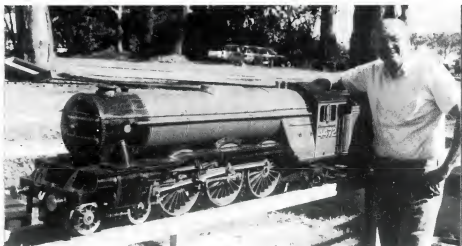
As the rails were dry, adhesion was not a problem. The steam engines were soon joined by Hugh Dempsey's now famous GM FP45 of the Neighigh Valley Railroad and Jason Maurer's new NSW 73 class. Both these engines are petrol electrics using Lucas C 40 automotive generators rewound as traction motors to a design developed by Les Boyd. They are very successful and the compact version can be axle-hung as per prototype. By mid afternoon both diesels were running in full multiple unit configuration. Either unit may lead and both are controlled from a control box mounted on the first driving car behind the second unit. Was this a first for 7¼"



Graeme and Kaye Clarke wasted no time in putting *Kaye-C* to work.



David Burke brings Ian Smith's *Bunyip* in for a drink



John Hagan and the "Flying Scotsman" which has not been out for almost a decade

gauge in Australia? Many thought it was, but Kel Broughton has been operating his two freelance Santa Fe petrol electrics in Canberra in a similar manner, but without remote control of engine throttles, since about May of this year. However, the lashup was most impressive and the developers of the system, Les, Hugh and Jason may be persuaded to write an article about the development and the techniques used for a future issue of AME. (What a good idea....how about it fellows....Ed.)

Just before midday Peter Smith and John Smith arrived from Newcastle and joined the traction engine line up with Peter's large Allchin. What a magnificent model this is! It was seen leaving the graded trails and heading across country, up hill and down dale, with John making it really bark as it climbed the grades. It made an interesting comparison with *Bunyip* when the two were posed at a level crossing. Both are near to the same scale, the Allchin being slightly larger at 0.375 full size and *Bunyip* at 0.302. The Allchin towered over the Bundaberg Fowler showing just how big some of these tractors were.

As the afternoon wore on some minor problems had caused the diesel electric locos to be side tracked for repairs and adjustments. *Bunyip* was coupled to *Kaye-C* and the two Bundaberg Fowlers provided "superpower" (starting tractive effort of 800 lbs) to haul every available car and passenger who could be rounded up. All went well for one lap but on the second, with no char left at all in the bunker of *Bunyip*, *Kaye-C* exerted its full effort and not only hauled the train but also pushed a dead *Bunyip* up the hill where it was quickly sent to the steaming bays in disgrace and blown down for the night. Yours truly (also in disgrace) declared it was too hot to drive locos and adjourned to the verandah of the Barracks where, beer in hand, he could watch the trains go by.

After dinner, cooked and barbecued by visitors and hosts, night running featuring *Kaye-C*, the only steam engine equipped with lights, continued. The evening was delightful, as first Graeme and then Tom Reinhold, one

of the traction engine boys, took the controls and lapped the track continuously beneath a star-studded sky until nearly 11 pm. I think we went some way to converting him to locomotives. Discussions political and railway stirred by Bob Farquar of C38 fame, then continued under the verandah of the Barracks until after midnight.

Sunday was, without a doubt, Standard Gauge Day. It began with Bill Henderson firing up his LNER K1 2-6-0 to his own design. As is usual with all of his engines, it cruised effortlessly around the track. A beautifully finished Royal Scot to Henry Greenley's famous two cylinder design for Basset Lowke (modified by Arthur Mears) appeared next. This super detailed model, in lined crimson lake livery and owned by George King represents the engines as originally built by the North British Locomotive Company of Glasgow. It features the Fowler tender and photo-etched builder's plates. Prototypically for the period, it does not have smoke deflectors.

By lunchtime John Hagan had arrived with his magnificent three cylinder *Flying Scotsman*, last seen in steam in late 1988 or early 1989 when its full sized namesake was visiting Australia. After Noel Bruce, in his role as Boiler Inspector, had conducted an examination and a hydro test, the engine was fired up and the safety valves were set. It was last seen with John easing it out onto the turntable. However, at this stage it was time for those of us who had come from afar to depart.

Before we bade farewell to Les, Noel and their stalwart local members we had a sneak preview of what is to come. It seems that the Berry Railway is venturing into narrow gauge. In the construction shed were two ride-in railcars, one based on an East Broad Top prototype and the other on the Gullfander of Queensland Railways. If you didn't make it this year, reserve the weekend containing the second Sunday in October in 1998.

Dr John Nicolson is President of the Canberra Society of Model and Experimental Engineers.

## Earth Leakage Detection continued from page 44 ....

with case from usual suppliers for about \$60.

**The Isolation Transformer:** A different way of dealing with the problem of electrocution from the mains is to put an "isolating" transformer in front of the device. This is a simple 1:1 transformer that depends on the fact that the secondary winding has no physical connection or reference to mains ground - one end of the winding only knows about the other end of the same winding. It doesn't know about mains earth unless the user has deliberately grounded one side. If a person touches one side of an isolated secondary, he might get a shock standing on wet ground, but it's not severe. He would have to simultaneously touch the other end of the same secondary with another part of his body. The two windings are physically isolated from each other and from ground. (Purists will argue that there may be a small and variable amount of "capacitive coupling" between the windings. Putting an earthed conductive "shield" between the two windings will block this capacitive coupling, but it's not done in normal transformers and of no concern here).

Transformer isolation is efficient, is widely used and very important in small appliances, particularly those requiring a simultaneous voltage stepdown, but the cost and size of 1:1 isolating transformers for a number of 1/2 or 1HP motors in the workshop would be prohibitive. As far as I know they aren't used industrially. (However there is one thing to be aware of in the case of AUTO transformers - if you happen to be contemplating transformers. AUTO-transformers are NOT isolating transformers! They have only one winding and the secondary is just a tap off the primary winding). So it's very important to make the distinction!

**Summary.** I offer a few rules:- **Rule 1.** DO use ELD on all outlets with certain potentially "risky" appliances such as radiators, toasters, irons, hair dryers, and for ALL portable mains operated tools. **Rule 2.** DON'T assume your house is wired correctly. **Rule 3.** DON'T assume the inspectors have checked it. They frankly admit they take the word of electricians they know. Unfortunately the master electrician doesn't usually do it himself - he has employees and apprentices. So just between ourselves, you should check it out yourself! Do this by numbering the circuit breakers and fuses, and draw up a table of the outlets they serve. Check each one systematically. **Rule 4.** DON'T connect your fridge or freezer to an ELCB circuit.

**Conclusion.** That's the background to ELD. Now it's now back to users. Those who have ELD, should consult the supplier or manufacturer of the VFC for advice on the best way to install it. Users might even get useful advice on the VFC from the electricity supply authority but probably only if they are lucky enough to get through to an electronic engineer, and that will be the exception.

# News Desk



compiled by David Proctor

**H**ello and welcome to 1998, our 11th year of publication. You are all well aware by now that Brian has decided to take a well-earned rest and who knows, heaven forbid, he might even be able to once again spend some time in his workshop! He has done a great job with this magazine over the last four years. In taking on this role I realise I have some pretty high standards to live up to.

The last couple of issues, as you would have noticed, have been rather late for various reasons. We will be back on time, however, with the March-April issue which you will receive at the end of February and you should be reading this about the end of January.

Over the past few months I have noticed the occasional plea from Brian for articles for the magazine, especially marine and workshop ones. Now that I have seen what we have in reserve I can well understand the urgency. If you have any ideas or thoughts that you could share, please do. Do not be concerned unduly about presentation — we can soon knock it into shape for you. Remember, what may seem mundane or 'old hat' to you may be a revelation to someone else.

## Can you draw?

The articles we do have in reserve are basically being held up because of the drafting. Our team of drafters are doing their best but we could always use some more help. Preparing drawings for publication is by its very nature, the slowest part of the whole operation. If you would like to have a go give us a call.

## Bushfires and Appeals

This topic has surfaced as a result of some lively discussion on the COALS e-mail chat line. The recent bushfires around Lithgow, as well as tragically claiming lives have caused some damage to the property of the **Zig Zag** Railway. Varying damage reports were circulating immediately afterwards, it subsequently emerging that the losses were two brake vans, trackside telephone lines, hut at Top Points along with two staff boxes and safe working documents, fencing, rail motor platform and the piping for the water reticulation system. Substantially damaged were one sitting car, two sleeping cars and two open wagons.

Remember some time back the idea was floated that miniature live steam clubs might collectively 'sponsor' a full size loco in a mu-

seum to enable restoration work to proceed. This has been taken one step further with the suggestion of a 'whip around' to assist the **Zig Zag** to recover. The idea that those of us with the miniatures could, if possible, help to preserve that which we love to copy certainly has merit. (Many of us are involved in both). What do you think? Discuss it with your club. If something is to be done, I for one, would be happy to co-ordinate it.

Further to this topic, a letter has been received from the Rail Transport Museum at Thirlmere (see *Letter Box*) expressing their whole-hearted support for the littl'uns helping the big'uns!

## Help

We are looking for a good working design for a steam turbo-generator suitable for 5" and 7 1/4" steam locomotives. Word has it that someone had the parts for one at the Wagga Wagga weekend in November. If you can help in this matter AME would be pleased to hear from you.

## The Internet

In line with the rest of society, various railway related organisations, other preservation groups and model engineering clubs are setting up pages on the Internet. I think that later on this year it would be timely to print a guide to known sites which are of interest to people in our hobby. If your club is establishing a site or you know of some which may be of interest let me know....and don't forget AME has its own site at: <http://www.ameng.com.au>

## Trade and Commercial

The latest offering from E & J Winter is the NSWGR C36 class locomotive in 7 1/4" gauge. Coming with a very comprehensive 156 item casting set, it represents the original version with round top boiler and square windowed cab. The engine can of course, be modified to the more modern version with Belpaire boiler and the appropriate detail differences. If the demand is there, further patterns will be produced to suit the later engine.

Other news from Ernie Winter is that further patterns are now available for the C38 in 7 1/4", though still far from complete, and some castings can now be supplied for the 7 1/4" C35. Both of these pattern sets are to be extended as demand rises.

Basic castings can also now be offered for the Australian designed and built two foot narrow gauge **Perry** cane locomotives in 7 1/4". These engines are considered best suited to more experienced builders who are prepared to work from less than fully detailed plans, scaled-up fully detailed 5" gauge plans and/or full size works drawings.

The accuracy of the patterns and castings has been proven by the number of C36 and Perry locomotives which have been completed by a well respected professional builder some of which are operating commercially, a good test for any miniature locomotive.

## Inaugural Farm Festival

Word has just arrived of a new event on the 'vintage, classic and restorers' circuit for steam engines, oil engines, restored farm machinery and vintage motor vehicles. **Farm Festival Victoria** is an initiative of the Bendigo Agricultural Show Society and the Bendigo Steam and Oil Engine Preservation Group. The event will be at the Prince of Wales Showgrounds, Holmes Road, Bendigo over Easter (April 10 - 12). The timing is to tie in with the Bendigo Easter Fair (Australia's oldest) and negotiations are under way for the running of steam trains from Melbourne for the event. Further details from the Bendigo Agricultural Show Society Inc., PO Box 219 Bendigo 3552 (Phone (03) 5439 5094

## AME Retail

Les Mouat advises that he now has new stocks of the **Blowfly** manual so if you have been waiting for a copy, now is your chance to own one.

When contacting or ordering from AME Retail please

- make cheques payable to **AME Retail**, not to Les
- print name and address clearly on all orders
- when you get the answerphone, state your name and phone no. clearly.

Les has received some messages which he is unable to respond to because the messages are either garbled or don't contain the above information. If he has not got back to you, now you know why!

## 42218

AME's 422 class locomotive (from the const. series completed late 1996) has been transferred to a new depot. It is on loan to the Wagga Wagga club under the care of Les Mouat. If you are visiting Wagga, you are welcome to take the throttle and have a drive. If possible, call Les on (02) 6926 4554 beforehand. Naturally, if the loco is rostered for public hauling on the day, you will need to show your proficiency or Les can arrange for you to drive under supervision. The Wagga society operates on 1st and 3rd Sundays.



# A Reversing Throttle Valve

suitable for control of oscillators and other stationary engines

by LGR Butterworth

*Drawings for publication by Neil Graham*

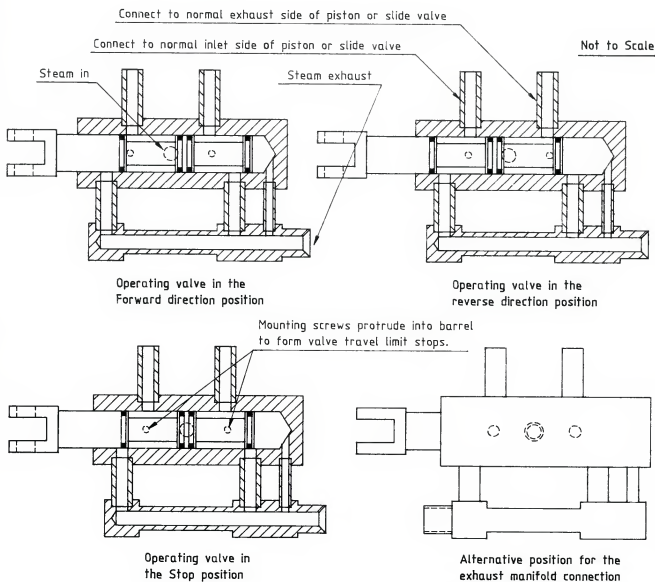
Over the years, I have made several small stationary steam engines. Some were oscillators and others had piston valves. I have favoured engines with two cylinders and all were designed as I went along, with my memory to guide me. While a few have been built incorporating reversible valve gear, I wanted to have a method of reversing the engines other than by mechanical means.

The enclosed drawings detail a design I have used on a couple of my engines. One of the engines was an oscillator and the other a piston valve engine. The unit shown was designed to operate as a throttle as well as a means of reversing the engine's direction of rotation. Dimensions on the drawings evolved around the materials on hand at the time.

Smaller O-rings could be used and the outer body could then be proportionately reduced.

I think the drawings are straight forward and should be easily followed by most enthusiasts. An operating lever of the builders choice would complete the design.

*(This design would ideally lend itself to radio control of marine steam plant ... Ed)*



REVERSING THROTTLE VALVE - ARRANGEMENT

# Farewell Vic



Vic as we like to remember him, driving his "Duchess of Hamilton"

One of New Zealand's best known model engineers, **Vic Hurley** passed away in November at the age of 78. Vic, who was a Life Member of the Hamilton Model Engineers has been a prominent identity in this hobby for many decades, and was known on both sides of the Tasman.

A fireman for NZ Railways in the steam days, Vic was a great source of anecdotes and stories. During the war he served in the navy, and was a stoker on the *Achilles* where he saw action in the famous Battle of the River Plate.

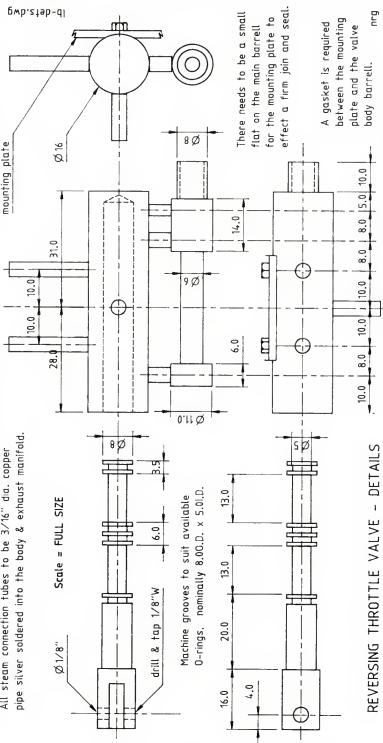
As an active model engineer of long standing, Vic built a considerable number and range of models. There were his versions of *Tich*, several *Juliets*, NZR F and Wab class locos, an LMS Jubilee and Duchess to name some. He also built a *Minnie* traction engine, boats and more. Over the same years he was a regular and tireless worker at the club and for many years oversaw the ongoing maintenance of the track. A decline in health made it more difficult for him to maintain this level of input when the club relocated to their present site, but nevertheless he remained actively involved.

Vic will always be remembered for his generosity of time and sharing of his workshop to help others get started in this hobby. I am one of those whom he helped and many a long hour was spent in his workshop building my first loco, a *Juliet*.

Our condolences and best wishes are extended to his wife, Ivy and the family he leaves behind.

Goodbye Vic, and thank you.

David Proctor



REVERSING THROTTLE VALVE - DETAILS

## Handy Hints

### Casting Sand

- I have found that bricklayers mortar sand has the qualities necessary for moulding. Moisten it slightly, then press some in the hand and it retains its shape. Left to dry, it breaks like chalk. Could be worth a try.

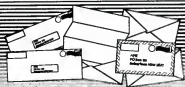
### Quick chipping hammer for the welder

- Needing one in a hurry, I heated the tang of an old 12" file, and bent it around on the flat. No heat treatment necessary and it does a good job

E.J.M.



# Letter Box



## Sandfly exhausts

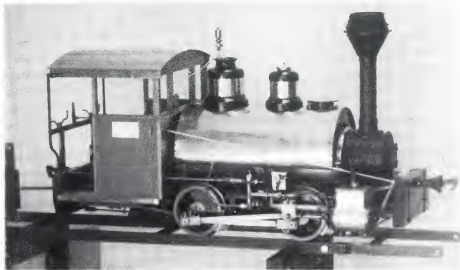
Sir,

In the Sept/Oct 1993 issue of AME, you published an article on the Sandfly locomotive. Included in this article was a story on my locomotive. Just to re-cap, my model of *Sandfly* is a very small 7 1/4" gauge locomotive (as locos go):- 110lbs all up weight with 4.625" diameter drivers, cylinders 1.5" x 2.125" and a 4.75" diameter boiler barrel. It has been trouble free for some 300 miles of running and continues to give a very spirited performance. I am convinced this is due to the exhaust system which I adopted and installed in the locomotive.

The exhausts from each cylinder are kept completely separate and are piped up into the smokebox side by side with separate blast nozzles. This is not my idea, but follows early American practice. The result is an extremely free running engine which will rev until it bursts (if you let it).

I find it rather surprising that any discussion on valve timing always dwells on the inlet conditions with not a word about what happens to the exhausts. I think it was Churchward who once said, "any fool can put steam into a locomotive, but it takes a wise man to get it out".

A double acting cylinder has two inlet and exhaust valves. The fact that all four are combined into one seems to cloud the issue.



Graham's model of Sandfly (photo G Brown)

Adjacent is a diagram of my locomotive's exhaust arrangement and valve timing. You can see that each exhaust valve closes 30 degrees before the end of the stroke, thus causing whatever remaining steam to be

compressed at a ratio depending on the port volume plus end clearance volume (compression ratio of approximately 2:1 in this case).

When exhausts are connected, each cylinder exhausts into the other one at the worst moment in the cycle, resulting in the compressed exhaust pressure becoming a large percentage of the steam chest pressure with a severe retarding effect on motion. If, however, we leave the exhausts unconnected, the compression pressure is much reduced, thus causing less retardation of motion.

I seem to recall that LBSC many moons ago talked about separate exhausts in one of his little chats, but I don't think he put the idea into practice. His proposal was to pro-

vide concentric exhausts (one inside the other).

My arrangement of side by side exhausts works fine with a tall chimney (as it did on early American locomotives), but the concentric idea may be required with short chimneys to provide adequate draught.

Graham Brown  
South Australia

## Letterbox Contributions

Contributions of letters by mail to:  
PO Box 176, Bundanoon, NSW, 2578 or  
fax to: (02) 6254 1641 are very welcome.

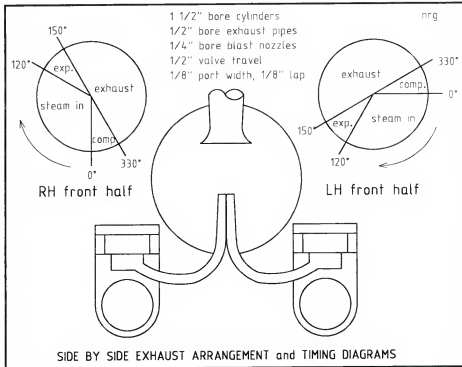
You can also e-mail your letters to:  
[ame@dynamite.com.au](mailto:ame@dynamite.com.au)

As far as possible, AME is an open forum for all members of our hobby. Therefore, all expressions of fact or opinion — as long as they are not libellous — will be considered for publication.

Please **type or clearly print** your letters, as script is often difficult for the typist to interpret.

The Letterbox is a popular medium of expression, so space is limited. Therefore, letters of 400 words or less will have a better chance of being published.

djp



## Digital read-outs

Sir,  
I have been reading the Sept-Oct AME about digital read-outs by Mr. Peter Dawes. This was very informative and I don't by any means intend to put it down.

There is a cheaper digital read-out method. Maybe most model engineers know about this already, but for those who don't, I would like to take this opportunity to tell them. You take a clock dial indicator with magnetic base and simply put the magnetic base on the cross slide and place the contact point on the tool post or tool holder. You then read off the dial (not the graduated dial on the cross slide). Backlash no longer matters because the contact point will not move until the tool does. You can use this for boring, turning and screw cutting operations on a lathe.

On the milling machine you can attach the magnetic base to the column and the contact point on the table. For the vertical feed I refer you back to the Jan-Feb 1997 issue of AME (Issue 70) and the story on the MPS Digital Read-out by Brian Carter and in particular to photo 4 on page 29. (the collar). Make the collar to suit your quill but instead of a pin, use a flat piece of steel. Mount the magnetic base to the housing of the quill and put the contact point on the flat piece of steel.

You can also use this on the tail stock of the lathe. Thanks to Mr Peter Dawes and Mr Brian Carter for their information, but I know a lot of people can't afford micro position sensors (MPS) or digital callipers. That is why I sent this in.

Brian Slater  
Victoria

## A great effort

Sir,  
I would like to bring to the attention of your readers some of the exciting "goings-on" at the Toowoomba Live Steamers. This is in informal letter as I am not a member of the club, but I wish to share with the readership of AME what I think is typical of core membership of most clubs.

Having no "home" for four years didn't deter the membership of around twenty two from fulfilling "the dream". A change of "parliament" within the local council brought forth an attitude of benevolence which led to the granting of a site and funding towards earthworks. The project would not have succeeded without this help. A very reliable source has informed me that individual club members contributed privately towards material for rail, which once again was vital to success. A huge amount of effort has been put into working bees during the week nights and trackside at weekends by the usual senior citizen stalwarts.

Have heard a few Brisbanites, and they are not the only ones, are eager to tread the rails and I am sure the 800 to 900 metres will present an opportunity for all drivers to show

their abilities when it comes to extracting the maximum from their charges. This track will produce sounds of hard working engines and there will be many vantage points to view the passing traffic. Seeing the transformation from nothing to where only a hundred metres of track is left to be laid is nothing short of extraordinary and has motivated my writing a few words of encouragement.

Well done fellas! When is the official opening? Hope we'll be kept posted.

Malcolm Johnson  
Queensland

*(Perhaps someone from the Toowoomba club would like to put together a few words and photos on their new track and site.....Ed)*

## 5 Digit Tachometer

Sir

I made the 5 digit tachometer in the October issue of *Silicon Chip* and can offer some hints that should be helpful to intending builders, especially model engineers wanting to use it on a machine tool. It's an excellent unit though a bit of overkill for small drill presses. Intending builders will need to refer to that article, although a copy of it is included in the Jaycar kit.

Peter Dawes  
New South Wales

*(Peter has supplied about five pages of text with this letter detailing various modifications and suggestions to the 5 digit tachometer. Rather than publish them in full here, AME will make them available to interested readers on request. They will be available both in written text and on disc. Simply send in your request with a blank 3.5" floppy disk and a stamped envelope to AME.....djp)*

## Restoration assistance

Sir,

I refer to your editorial comment included in your July 1997 issue which raised the possibility of scale modellers helping to raise funds to restore mainline steam locomotives through the concept of various Model Engineering Clubs "adopting a loco".

Clearly any assistance provided by the members of Model Engineering clubs in the restoration to service of a mainline steam locomotive would be greatly appreciated, by this and other rail preservation groups, and your editorial comment, in our particular instance, was very timely.

At our Board meeting held on 22 October 1997, it was agreed that, considering the failure of all recent steam locomotive restoration appeals, that all efforts would be concentrated on raising funds towards the return to service of steam locomotive 3526. The expected cost of this restoration is anticipated to be in the

vicinity of \$30 - 40,000, to get the ball rolling in this respect, and to gauge the interest of various steam enthusiasts in this project, two fundraising initiatives have been taken utilising donated items. *(These were in the form of a raffle for a quality clock which included a Kenneth G Bowen painting, and a postal bid auction for two limited edition prints. Both of these ventures have now closed so there is little point in publishing details.....Ed)*

Time only will tell whether these two initiatives have been successful or not.

In respect of the idea raised in your editorial comment of various Model Engineering Clubs hosting special fund raising days to support a restoration, such as that envisaged for 3526, such a concept is of great interest to this Museum and we would be happy to provide any assistance, such as advising all of our members of the various operating days etc. to help in their success.

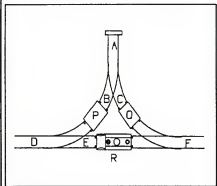
Finally, I must say that I wholeheartedly agree with you when you indicate that such co-operation is an exciting concept and that it would indeed go a long way to securing a realistic future for rail preservation groups.

Graeme Bell  
Director, NSW Rail Transport Museum.

## A 100 YEAR OLD SHUNTING PROBLEM

P and Q are two wagons and R an engine on the lines as marked. The two sidings B and C have a portion at A in common, which is just long enough to hold a single wagon but not long enough to hold the engine, so that if the engine runs up the siding at D, B, A, it must come back the same way. It is required, by shunting, to interchange the two wagons P and Q without allowing flying shunts. That is to say, a wagon can only move when in contact with the engine, either being drawn by it or pushed by it.

*(solution next issue)*



*(Found in a Ballarat newspaper dated Sept 4th, 1897...courtesy of Big Wheel News.)*

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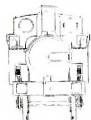
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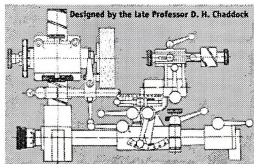
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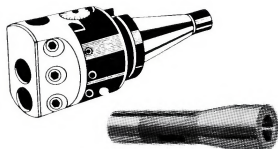


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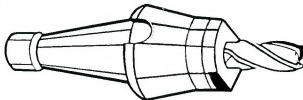
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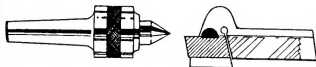


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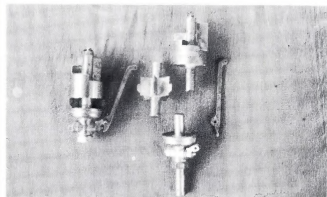
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